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ON PROSODIC STRUCTURES IN AUSTROASIATIC DIACHRONY: 'RHYTHMIC HOLISM' REVISITED IN LIGHT OF PRELIMINARY ACOUSTIC STUDIES

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Abstract
This paper revisits claims regarding the division between Mon-Khmer and Munda languages on prosodic grounds (Donegan and Stampe 1983, 2002, 2004; Donegan 1993). Specifically, we attempt to re-evaluate their claims by investigating pitch at the level of the word in three languages from different families within the Austroasiatic phylum. First, we critique Donegan and Stampe's work, presenting data on Sora and other Munda languages showing a similar prosodic pattern across the whole family that does not conform to claims of a rhythmic holistic shift in prosody to the degree previously suggested. Second, we present a pilot acoustic study of Sora phrasal prosody in comparison with prosodic structures in both Pnar, a language in the Khasian group (the Munda languages' geographically nearest relatives), and prosody in Lawa, a Palaungic language. We find that Khasian word/phrase prosodic structures are quite similar to those found in many Munda languages, which has interesting implications for our understanding of the development of Austroasiatic languages.[1]

Keywords: Austroasiatic; word; phrase; prosody; pitch; Sora; Pnar; Lawa; Khasi

ISO 639-3 codes: srb, pbv, lwl, kha[2]

1 Introduction

Among the concerns of linguists working on Austroasiatic (AA) languages has been how to reconcile the typological differences between "(a) the largely co-ordinating (*sic*) and analytic Khmer-Nicobar languages, and (b) the largely subordinating and synthetic Munda languages." (Pinnow 1963:145) In particular, as Jenny, Sidwell, and Alves (Forthcoming) note, "Claims have been made that the major change that occurred in Munda languages was from rising to falling intonation patterns (Donegan and Stampe 2004), and that all other changes naturally followed from this." Despite indications that there are many different intonation contours throughout Munda languages (cf. Anderson 2015, Forthcoming), there are few investigations on

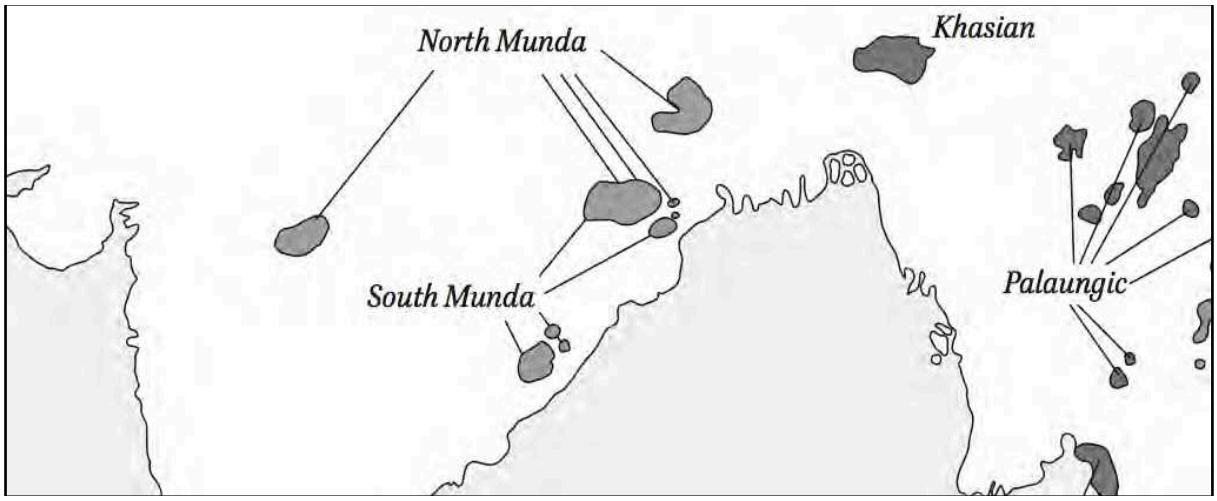
[1] We wish to acknowledge the following speakers, consultants, and language experts who have assisted us in gathering and analysing the data: Opino Gomango and Srinivas Gomango (Sora), Fidell War (Pnar), and Greg Blok and Ta Saai (Lawa). We thank attendees of ICAAL 7 for their comments, and two anonymous reviewers for their insightful critiques which helped greatly to focus this paper. We also acknowledge support from the Swiss National Science Foundation and a Singapore Ministry of Education grant MOE2012-1-100 (for work on Khasian and Palaungic), National Science Foundation Awards 1500092 (for work on Gutob) and 0853877 (for work on Remo), National Endowment for the Humanities Award PD-50025-13 (for work on Gta'), a Genographic Legacy Fund award (for work on Ho), several National Geographic Society awards (for work on Sora, Santali, Mundari, Kera', Gorum, Juray, Korku, Nihali, Juang and Kharia) and an award from the Zegar Family Foundation (for work on Birhor). Also thanks to Dr. Bikram Jora and Dr. Luke Horo for valuable assistance in data recording sessions during fieldwork and fruitful discussion thereon.

[2] Abbreviations used for examples are: ACT Actor, AUX Auxiliary, CAUS Causative, DES Desiderative, IPFV Imperfective, NEG Negative, NPST Non-past, PRON Pronominal, PST Past, RDPL Reduplication, RECIP Reciprocal, TAM Tense-Aspect-Mood, UND Undergoer, 1PL First person plural, 1SG First person singular, 2SG Second person singular, 3 Third person.

AA languages that would clarify prosodic differences and similarities between the Munda languages and their eastern cousins.

In particular, the existing literature on prosody in AA languages and its relation to the historical development of AA is limited to four papers (Donegan and Stampe 1983, 2002, 2004; Donegan 1993) that have been widely cited by scholars but which have various problems of evidence and methodology. In order to suggest a clear direction for prosodic research in AA and put the field on firmer scientific footing, we critique the previous research and present data on Munda that reveals similar stress and pitch patterns across the whole family, hard to square against claims of a rhythmic holistic shift in prosody (Donegan 1993). We also conduct an initial instrumental investigation of pitch in three languages of the AA phylum, submitting this data and our analysis in order to contribute to discussions about the development of AA languages.

Figure 1: *Munda, Khasian and Palaungic languages (adapted from Jenny and Sidwell 2015)*



The languages we investigate in our pilot study are Sora (Munda), Pnar (Khasian), and Lawa (Palaungic, Waic), all of which are reported to have no contrastive lexical tone. The language families that these individual languages belong to are geographically located in non-contiguous areas, but on a relatively straightforward West-East plane (Figure 1) stretching from eastern India to northwest Thailand. Munda languages are located in and around Orissa in Eastern India, while the Khasian group are in North-East India north of Bangladesh, and the Palaungic languages are found in North-Eastern Myanmar and North-Western Thailand. This makes the Khasian languages the geographically nearest AA relatives of Munda. Scholars have for a long time considered the Khasian and Palaungic families (and somewhat more distantly the Munda languages) to be closely related within the AA tree based on lexical similarity (see Diffloth 2005; Sidwell 2015), and thus these languages provide an interesting comparison, likely sharing a common parent.

The paper is structured as follows. In the remainder of this introduction we focus on describing current issues in the growing field of prosodic typology, introduce the claims that have previously been made regarding AA prosody as well as the prosodic structure of surrounding languages more generally, and define the terms that we will use throughout the rest of the paper. In section 2 we provide a detailed critique of D&S's claims, involving review of recent work among Sora and other Munda languages, information about Munda word-hood, observations regarding areal and genetic homogeneity, and phrasal prosodic features that may be common to Munda and Khasian languages. In section 3 we then describe the instrumental study we conducted to compare the languages. Section 4 concludes with a discussion of the findings and implications for further research.

1.1 Prosodic typology

Before looking at the specifics of the data and detailing the issue within the field of comparative Austroasiatic linguistics, we first turn to a (brief and by no means comprehensive) synopsis of the meta-theoretical and methodological issues in the description of prosodic domains and word/phrasal intonation. Such issues are of particular concern for researchers attempting to analyze these features of Austroasiatic (and other) languages.

There is currently a lively, ongoing debate about prosodic analysis, and points of discussion include: 1) what the basic units of analysis should be, 2) what the properties that define these prosodic units are and how they contrast with each other, and 3) what the interface between the abstract phonological structures and their instrumentally trackable acoustic manifestations or cues might be. Among the key scholars contributing to this debate, Hyman, Gordon, van der Hulst, and Jun all have fairly distinct approaches partly overlapping in assumptions and terminology. All, however, assume that different phenomena belong to and operate at different domains or levels in the generation of well-formed utterances.

Such a position minimally recognizes a lexical layer and a post-lexical or post-grammatical layer with inherent hierarchical relations.[3] What this means is that such hierarchical levels could logically reference different interface options with other domains (lexicon, syntax, etc.), not strictly the phonetic/phonological domains alone. This is important because many of the distinctions made by these theorists in this area reference such different analytical strata and assume *a priori* that they exist. However, not all approaches to syntax are multi-stratal or derivational/generative, and therefore it is not fully clear how such terms can be reconciled with other (e.g., functionalist) approaches to 'grammar'.

Given the diffuse and varied nature of the acoustic or phonetic cues associated with perceived prominence, i.e., 'stress' or 'accent', it is well known that duration, intensity, fundamental frequency, spectral tilt and various other features sometimes referred to as 'hyper-articulation' can all conspire to serve as acoustic correlates to 'stress'. Complicating this further is that there are virtually no studies on the prosodic relationship of 'word' vs. domains of strings of sounds at a higher hierarchical level within a language. That is, we only know that words recorded in isolation are different prosodically than those that occur in natural or focused speech due to physical constraints on phonation and speaking (e.g. terminal drop), phrasal or utterance-level intonational features/characteristics of the language, or discourse-sensitive prominence marking through pitch or intonational perturbations, whether anchored in information *structure* (e.g. focus vs. topic) or in information *status* (given vs. new).[4] This makes prosodic research a fascinating and yet difficult topic, in which researchers attempt to find patterns while at the same time trying to control for effects at multiple levels.

Generalizing for the sake of synopsis and at the possible risk of oversimplifying, there is a major difference between the views expressed by Hyman and that of van der Hulst, Gordon and Jun: Hyman considers only 'tone' and 'stress' to be the relevant and active parameters, and that so-called 'pitch accent' systems are nothing more than intermediate systems between canonical stress systems and canonical tone systems, whereby pitch-denoted prominence is restricted to syllables that are potentially bearers of primary stress. 'Tone' in a language is defined by a system where "an indication of pitch enters into the lexical realization of at least some morphemes" (Hyman 2006:229). 'Stress' is defined as having to do with "metrical prominence" (Hyman 2006:231) in a system whereby stress accent is defined by two features, "obligatoriness" and "culminativity" such that "every lexical word must have *at least* one syllable marked for the highest degree of metrical prominence" (obligatoriness) and "every lexical word must have *at most* one syllable marked for the highest degree of metrical prominence" (culminativity). In other words, every word must have a head syllable in the Autosegmental-Metrical framework (sometimes recast as a requirement for a head foot). Hyman (2006:231) further identifies a salient functional distinction between 'stress' and 'tone' in language systems: tone is paradigmatic and distinctive, stress syntagmatic and contrastive.

Some prosodic systems seem to behave very differently, in what researchers have called 'pitch accent' languages. For Hyman, pitch accent is a system partly tonal and partly 'stress'-based. Other researchers have very different definitions of what they consider to be pitch accent. Thus, according to Hayes (1995:49-50)

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[3] With respect to the hierarchical structuring of sound and prosodic units, while not every language recognizes all possible levels, a maximal extension of such domains might include the following levels smallest to largest: mora > syllable > foot > prosodic word > accentual phrase > intonational phrase > utterance. This leaves aside for now the non-trivial issue of how these combine and how to conceptualize the structure that models their hierarchical organization.

[4] As Roettger and Gordon (2017: 7) remind us "spontaneous speech is expected to yield more variable data due to the larger number of confounding factors (e.g., higher level prosodic structure, intonation, syntax, etc.)" and also that in words recorded in frames (2017: 4), even if shielded from edge, invariably the frame introduces new information and the words in the different slots are implicitly contrasted with each other.

"pitch-accent languages must satisfy the criterion of having invariant tonal contours on accented syllables, since tone is a lexical property". Bybee et al. (1998:227) put it this way: "a pitch accent system is one in which pitch is the primary correlate of prominence and there are significant constraints on the pitch patterns for words". Jun (2014) defines pitch accent, incredibly, as a system in which a certain, but not every, syllable of the word has lexical specification of pitch, showing syntagmatic contrast, but not 'stress' in the sense of Beckman (1986).

Harry van der Hulst and Matthew Gordon call into question Hyman's two conditions of "obligatoriness" and "culminativity" as necessary and sufficient to characterize stress to the exclusion of other features. As all researchers reviewed here point out, while one can identify the most prominent syllable in a string of connected syllables within a domain (the 'prosodic word'), and this is a psychologically real concept to speakers, the acoustic correlates of such perceived prominence can be a conspiracy of different phonetic features such as duration, intensity, and pitch. So 'stress' per se is a diffuse concept or a kind of epiphenomenon of perceived salience, however acoustically cued in particular languages. Gordon and van der Hulst (to appear) suggest that duration is the most reliable and consistent cue of 'stress' cross-linguistically, while Gordon and Roettger (2017:7) suggest that fundamental frequency played a greater predictability role in 6/11 languages in a sample, while duration did for only 5/11 of these (three of which have lexically-distinguishing tone as well).

van der Hulst (2014:5) comments that "when stressed syllables are measured in out-of-focus positions they do often not include pitch as a significant factor", downplaying the role of pitch in word-level prominence distinctions. He notes further (2014:28) that in many cases, pitch properties associated with stressed syllables are actually those linked to an intonational pitch accent. So pitch prominence in a speech stream may turn out to reflect other intonational/prosodic considerations as natural declination in pitch towards the end of utterances or discourse-grounded focalization or topicalization of the prominent element. As Hyman (2006:246) reminds us, for particular languages, "if word stress is so hard to find, perhaps it is not there at all". This is worth keeping in mind for the discussion on the varied and opposing views of 'stress' in the Munda languages below.

Turning to 'stress' proper, van der Hulst (2012:1495) breaks the meta-category of 'stress' into several components that interact or 'conspire' in its surface manifestations, specifically he enumerates 'stress' relating to four distinct phenomena: accent, edge prominence, rhythm and weight, each of which may have a 'stress correlate', viz., stress^{A} stress^{EP} stress^{R} and stress^{W}. The first three correlates involve strengthening of articulation with effects on duration, intensity and pitch; stress^{A} is lexical and may also correlate to greater phonotactic complexity, while stress^{W} may be nothing more than the perceptual effect of the intrinsic properties of heavy syllables. On the reasons to distinguish 'stress' from 'rhythm', van der Hulst (2012:1496) comments that "primary 'stress' location is often subject to morphological information and lexical irregularity, (but) the distribution of rhythmic beats appears to always be fully regular and automatic", or in his framework, primary stress belongs to the lexical level, full rhythmic pattern to the post-lexical level in a multi-stratal, generative grammar. On the distinction between 'accent' and 'rhythm', van der Hulst (2012:1497) comments that accent is the formal representation of primary 'stress' and rhythm pertains to rhythmic/secondary stress, but that the 'window' of 'accent' is restricted to word peripheries, specifically to building one foot at the Left or Right periphery of a word, while in 'rhythm', beats are assigned to syllables post-grammatically, with an interface condition that an accented syllable must have a rhythmic beat too; in the hierarchical ordering of elements this belongs to the utterance-level. Subsequent to that, a second factor operating at the utterance level is edge prominence, which serves to strengthen syllables on the edge opposite to the accent.

In this model, A, EP and R are all abstract notions with no inherent phonetic content, while 'stress' only means the phonetic correlates of these three (little more than prominence) and instantiates articulatory force that exaggerates or hyper-articulates inherent properties of the speech signal along dimensions of time (duration), fundamental frequency (pitch), intensity, etc. Thus, A, EP, and R are properties of syllables but syllables come in different forms: they may have different weight, for example, and heavy syllables however defined often have a special status in systems. As van der Hulst (2012:1497) puts it, heavy syllables can influence the location of A, EP and R beats, but in the absence of these extrinsic features, heavy syllables can intrinsically be perceived as prominent. In effect, 'stress' really is nothing more than prominence and the phonetic properties usually called 'stress' basically serve to provide the head with greater perceptual salience than all non-heads in the hierarchical organization mentioned above (van der Hulst 2012:1513).

The work of Jun is primarily concerned with units above the word level. Jun (2014) distinguishes at least three possible levels relevant to prosody and intonation above the word, but says some languages only use one. The level immediately above the word she calls the Accentual Phrase [AP] and the highest level the Intonational Phrase [IP], with an intermediate node called "ip". Prosodic units in Jun's approach (2014:433) can be defined by two different types of domains and their associated phenomena: by the degree of juncture and by intonation pattern. An AP may be mora-, syllable- or stress-timed (Jun 2014:432). Generally, a prominent word comes at the beginning or end of a prosodic unit (as for van der Hulst) and there is a phrasal tone demarcating the edge of such a unit. If a sentence is short, it will be one IP, if it is long it will be broken into two or more IPs. The length of an IP can vary considerably language to language, e.g., 7-15 syllables, but typically they are 1.5 seconds in length on average (when controlled for discourse style and genre), while APs tend to include one morphosyntactic content 'word' (plus optionally other elements) and are typically 3-5 syllables cross-linguistically.

Jun (2014:440), following Cruttenden (1997:8-9), define tone, as Hyman does, by a system that has "prescribed pitches for syllables or sequences of pitches for morphemes or words" with a paradigmatic contrast and that stress accent systems can be identified if a certain syllable in a word is more prominent than others in duration and/or amplitude, thus showing syntagmatic contrast. In Jun's terms 'rhythm' and 'prosody' pertain at different levels. Thus (Jun 2014:441) states that the rhythmic pattern refers to a timing unit below the level of the word, while the prosodic pattern refers to a prosodic unit above the level of word. So for Jun, 'word stress' would be a rhythmic pattern, while 'phrase stress' would be a prosodic pattern.

There is general agreement on certain prosodic patterns cross-linguistically, such that according to Gordon et al. (2010:133) the "unmarked intonational tune in most languages consists of a final pitch trough... whereas phrasal stress is typically associated with raised pitch"; some languages resolve this by pushing stress to the penultimate syllable. This also aligns with Ladd's (2001:1381) comments that overall pitch trends within an Intonational Phrase show a decline from beginning to end, and new ones can be marked by a local sharp rise 'reset'. IPs in utterance-final position typically have a drop of pitch at the end. This can be moderated, suspended or even reversed in non-final position and in questions.

We can see from this review of the field of prosodic typology that there is some diversity with regard to how prosodic contour relates with specific word or phrasal effects, uses, and phonetic realizations. However, all the authors we reviewed here agree that prominence plays a role in disambiguating units of speech, though exactly which units are being disambiguated (word, phrase, etc.), their exact relationship to morphological/grammatical/discourse features, and the exact correlates of such prominence, is a language-specific question. For our purposes, this requires that we specify the precise correlates of the prominence being investigated for all the languages under investigation, to ensure that we are comparing similar things.

Moreover, for polysynthetic languages such as Sora, specific issues arise in the analysis of the word vs. phrase, and indeed the difficulties inherent in analyzing prosodic domains in general are magnified. As in many languages that have been described as polysynthetic (Bickel and Zúñiga 2017), the notion of word in a unitary sense is largely elusive in the languages of the Munda family. Approaching the issue from the perspective of prosodic typology, Munda languages offer conflicting information as to what one would want to call a 'word' both within individual languages and across the family as a whole, with different (morpho)phonological processes defining different prosodic domains equal to, as well as smaller and larger than, what a 'traditional' understanding of 'word' would entail, and thus, projecting back into earlier stages in the development of the languages, what the prosodic, etc., structure of a 'word' in proto-Munda might have been like. We revisit this in our critique of the claims of Donegan and Stampe below.

1.2 Donegan and Stampe on prosody in AA

The two scholars who have most seriously broached the subject of prosodic structures in AA languages are Patricia Donegan and David Stampe (henceforth 'D&S' except where specific papers are cited), whose major articles (Donegan and Stampe 1983; Donegan 1993; Donegan and Stampe 2002; Donegan and Stampe 2004) have been widely cited by scholars on this issue. These articles consecutively update many of the same arguments and claims regarding the prosodic nature of Munda vs. Mon-Khmer languages – the term

"Mon-Khmer" here refers to all non-Munda AA languages, following a traditional branching-tree reconstruction of AA.[5]

The central claim of these papers is summed up in the statement by Donegan and Stampe (1983:1) that "Munda and Mon-Khmer are typologically opposite at every level" and their most recent tabulation of differences (from Donegan and Stampe 2004:3) is partially reproduced here as Table 1 below. It seems clear that the differences tabled there are major, and such has been the accepted view of linguistic scholars for many years. The general observation is that there is a clear typological distinction between the AA languages located in eastern India (Munda languages) and all other AA languages, particularly when it comes to what is counted as a 'word'. The reason for such a difference has been attributed to the influence of neighboring Indo-Aryan and Dravidian languages (see Emeneau 1954, 1956; Pinnow 1963, 1966), which are described as largely agglutinating and polysynthetic. South-East Asian AA languages, on the other hand, are considered largely isolating and only mildly synthetic (see above references, also Enfield 2005).

Table 1: *Differences between Munda and Mon-Khmer (as per Donegan and Stampe 2004)*

	Munda	**Mon-Khmer**
Grammar:	Synthetic	Analytic
Word Order:	Head-last: OV, Postpos.	Head-first: VO, Prepos.
Phrases:	Falling (initial)	Rising (final)
Words:	Falling (trochaic)	Rising (iambic/monosyllabic)
Affixation:	Pre/infixing, Suffixing	Pre/infixing or Isolating
Timing:	Isosyllabic, Isomoraic	Isoaccentual
Syllable Canon:	(C) V (C)	(C(u)) + (C) V (/) (C)
Etc..		

To explain the differences that they tabulated, Donegan and Stampe (2004:5) sought "a linguistic opposition which might pervade and organize every level from syntax to phonetics." Despite the fact that such linguistic oppositions do not really exist, in their analysis they seem to have discovered that "the only plausible candidate is initial vs final accent in phrases and in words" (2004:5). This is a slightly different formulation from Donegan (1993), where she frames the discussion of prosody in terms of *falling* (2004: initial) vs. *rising* (2004: final) accent. As she states in this paper: "Regarding the phonetic manifestation of accent, I will mention only stress and pitch. Stress accent seems to be a combination of greater effort and greater length." (1993:10) She goes on to say that:

> "Falling-accented languages are typically mora-timed, and in that case there can be no lengthening of accented syllables, and so they mark accent, if at all, with pitch. But rising-accented languages, if they are stress-timed, are free to lengthen accented syllables, and so they mark accent with stress." (1993:11)

Besides using somewhat confusing terminology (from what we can tell, 'accent' is used by D&S somewhat interchangeably with 'stress' and also has the sense of 'prominence' as used in more recent phonological literature), D&S seem to state that in languages described as being 'mora-timed', accent (or stress) is primarily marked by pitch (F_0). Languages described as being 'stress-timed,' on the other hand, mark accent (or stress) by a combination of length/duration and intensity. This sets up a dichotomy that separates languages into those that use pitch for stress and those that do not (though stress is usually a bundle of features, of which pitch is often a component, see Gordon and Roettger 2017). It is not fully clear whether her use of 'mora-timed' is intended to align with the 'heavy' and 'light' syllables identified by Henderson (1952) for Khmer. Most AA languages, are syllable(mora)-timed (according to D&S's definition) and it is

[5] Sidwell (2015) suggests that a more strongly-branching radial tree with "spokes" from a single origin might have more explanatory power. Independently but similarly Anderson (2015, 2016) has suggested that within Munda only North Munda with sub-branches of Kherwarian and Korku, Sora-Juray-Gorum and Gutob-Remo, consisting of the named languages, are valid intermediate taxa, all other languages being isolated groups coordinate with these.

thus unclear why Donegan argues for 'stress-timed' languages being equated with 'rising accent' when most Mon-Khmer languages (in her view) are not 'stress-timed' but do show 'rising accent'.

Donegan (1993:3-5) uses the observations in her paper to make historical claims, stating that:

> "Proto-Austroasiatic had rising accent and head-dependent word order, like Mon-Khmer. Munda languages reversed the structure to falling accent and dependent-head order, but preserved the old word order in the morpheme order of complex words… Proto-Austroasiatic, like Mon-Khmer (and other mainland Southeast Asian languages) had rising accent not only in phrases but also in words. Munda shifted to falling accent not only in phrases but also in words."

These claims nicely account for the perceived differences between "Munda" languages on the one hand, and "Mon-Khmer" languages on the other, but unfortunately they gloss over some of the discrepancies between this generalization and the actual prosodic realization of individual languages. We address this issue in sections 2 and 3 by presenting data on some of these languages.

1.3 The terms defined

Before venturing further into the discussion, and based on the issues raised in sections 1.1 and 1.2 above, we need to define the terms we will use for the remaining sections of this study so that it is at least clear to the reader what we intend when we use the terms. Unfortunately, due to the lack of clear correlates and definitions of terms in D&S, this requires us to make some assumptions.[6]

We assume that the use of "accent" by D&S corresponds to "stress", in part because the words are used somewhat interchangeably in their work. Below we use the term "stress" to refer to a language-specific indication of prominence at the syllable level (within a word or phrase). We also identify three phonetic correlates of stress (pitch/F_0, length/duration, intensity) and their relation to its realization in each of the languages we discuss. This means that for each language, we can identify a phonetic cue (or cues) that indicate(s) prominence of a particular syllable within a word or a phrase.

We take the use of "rising" in D&S to refer to an increase in some phonetic correlate of stress across the time-span of the domain of investigation in question (word, phrase) and the term "falling" to refer to a decrease in such a correlate. We can then use this correspondence in terms to compare our findings with theirs. So if increased pitch is a primary correlate of syllable prominence for a particular language (as it is for the languages in our study), and given a two-syllable word in that language where pitch increases to the second syllable, the word can be described as having a "rising" stress pattern. Whether the language consistently shows this pattern in two-syllable words, and whether such a pattern aligns with D&S's claims for the particular language can then be assessed.

2. Detailed Critique of D&S's treatment of Munda and 'Mon-Khmer'

As noted above, D&S make strong claims about rhythmic holism based primarily on observations and examples drawn from Sora, in comparison with sweeping generalizations regarding the non-Munda Austroasiatic languages. Below, we critique several specific issues regarding these claims: Sora correlates of

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[6] In the full-scale study called for by our preliminary study here, we must rigorously define all cross-linguistically quasi-generalizable terms that we might need in the prosodic analysis of the Austroasiatic languages diachronically and synchronically. Thus, to use one scale of increasing prosodic domains (Hildebrandt and Bickel 2007), one might seek to determine the existence and defining parameters of such units as *mora, syllable, foot, 'word'* (*p-word*, *m-word*), *'phrase'* (*phonological phrase*, *intonational phrase*, *accentual phrase*), and *utterance*. Here the notoriously problematic 'word' and 'phrase' may have several non-overlapping or partly overlapping domains they encompass, which may or may not have unique relationships with other terms as widely understood or used in typology, or with independently validated syntactic units in languages under investigation. However, as there are a wide range of features that might help to determine whether such units have any analytic validity for any given language, each language will likely have different and specific manifestations of prosodically sensitive or otherwise phonologically active processes whose patterning would uniquely determine the nature and extent of the various analytic atoms that one might seek to compare. In addition, we must have a rigorous definition of each of the following: *stress, tone, intonation, accent*, and *rhythm*, so that we know that we are truly comparing like with like when we approach the comparative study of prosodic phonology in Austroasiatic.

stress (section 2.1), Munda word-hood (section 2.2), areal and genetic over-generalizations regarding "Mon-Khmer" and South Asian phonologies/prosody (section 2.3), and phrasal prosodic features of Khasian languages that were ignored by their analysis (section 2.4). Before we move to these specific critiques, however, we have several general critiques of D&S.

D&S claim that there is a 'rhythmic holism' in language that drives word formation, and while we are sympathetic to the idea, it risks oversimplifying a highly complex issue. The various concerns to be addressed here are: 1) the descriptive accuracy of prosodic correlates in the individual languages that such a claim is based on, 2) the role of prosody at the sentence and the word level in individual languages, 3) the historical development of these languages, and 4) the lack of data to back up the claims of the authors.

The last issue is related to the others, and so we address it first. We take the position that scientific linguistic research should be evidence-based. Strong claims should be based on strong evidence. The claims of D&S, while repeated in multiple publications, are supported by few Sora examples, with only one of the sentences annotated for prosodic rhythm, and no quantitative information about the analysis they undertook.[7] We acknowledge the difficulty of making and analyzing recordings during the 1980s-90s, and the fact that linguists during this period had a different standard for acceptable evidence to back up their claims. In the 21st century, however, overarching claims of phonological (prosodic) patterns that are not backed up by diagrams, statistics, and (or at the very least) reference to a corpus of data, if only rudimentary, are highly problematic, particularly when programs/technology such as Praat (Boersma and Weenik 2018) and handheld recorders are widely and easily available, not to mention many means for sharing data online. This is the main issue that we attempt to remedy (albeit incompletely) with our pilot instrumental study.

Regarding the first issue noted above, there is concern regarding the descriptive accuracy (perhaps 'descriptive completeness' is a better term) of prosody, stress, and their correlates in existing descriptions of the Austroasiatic languages in question. To our knowledge, existing descriptions of these languages do not describe such features to a great degree. Therefore, it is unclear what data besides their own underlies such claims by Donegan and Stampe about overarching "Munda" or "Mon-Khmer" prosodic patterns. To clarify: many of the AA language families in question have only a few languages for which some description exists, and these descriptions often either contain no prosodic information or contain only limited and impressionistic accounts of prosody. We discuss this further in section 2.2 below.

Regarding the second issue, D&S present the Munda languages as a monolithic entity with no internal variation that aligns 'rhythmic' structures 'holistically' with purported South Asian norms. However, what do we know about the role of prosody at the sentence and word level in individual Munda and "Mon-Khmer" languages? For that matter, beyond impressionistic observations (see Khan 2016), what do we know about prosody in South Asian languages? It seems clear from research on prosody that different languages have different uses for prosody at the word and sentence level for (word/sentence) boundaries, supra-lexical information and potentially other features (besides the references reviewed above, see Kawaguchi et al. 2006; DePaolisa et al. 2008; O'Brien et al. 2014; Xu 2011, 2012). Further, and as noted above, prosody researchers do not always agree on terminology, though recent work in this area is beginning to bring clarity. In section 2.3 we discuss this in more detail by providing data showing that the word and prosodic picture is rather diverse for Austroasiatic and South Asian languages.

Regarding the third issue, the claims of D&S are not just a claim about the existence of certain phonological features/structures in the modern languages, but rather a hypothesis about the state of the parent

[7] A scan of Austroasiatic examples in the work of D&S gave the following counts. In Donegan and Stampe (1983): 14 Sora sentences illustrating syntax, 7 Khmer sentences illustrating syntax, 7 Sora words illustrating morphemes, 2 glossed Sora examples, 2 annotated glossed Sora examples, 2 Sora examples from poetry/verse, and 1 glossed Khmer example. In Donegan (1993): 3 Sora genitive sentences, 3 Sora genitive words, 1 Sora glossed word, 1 Sora glossed clause, 11 glossed Sora words with stress/accent marking. In Donegan and Stampe (2002): 3 disyllabic Khmer words with accent marking, 3 disyllabic Sora words with accent marking, 4 glossed Sora sentences, 4 glossed Khmer sentences, 1 Sre sentence, 4 Sora words/phrases of 3 or 4 syllables, and set of word comparisons in Kharia, Sora and Mundari illustrating sound changes. Donegan and Stampe (2004): 3 Sora sentences, 1 Khmer sentence, 3 Khmer words, 3 Sora words, 1 Sora word with rhythm annotated, 3 Khmer sentences with rhythm annotated. Many of these examples are re-used across publications and there is no indication regarding how representative such examples are of their data.

language, Proto-Austroasiatic. Germane to this concern is the observation mentioned above in section 1.1 regarding the problem of 'word' vs 'phrase' in polysynthetic languages, significant not only from the perspective of an adequate synchronic analysis of the contemporary Munda languages, but their history as well. D&S treat the Munda languages as a monolithic entity in opposition to "Mon Khmer" languages with respect to effectively all typological features, allegedly mediated and triggered by a fundamental shift from rising to falling rhythm. Such a total resetting of typological parameters would have to have occurred (likely gradually) during the emergence of proto-Munda from late-proto-Austroasiatic/pre-proto-Munda for it to uniformly apply to all the modern Munda languages. As it turns out (and as we discuss below), there is both significant and revealing synchronic variation among the Munda languages that demonstrate that a one-time resetting of parameters is untenable, and for some of the languages has not occurred.

Below we review some recent work on Sora, address specific claims of Munda word-hood based on examples used by D&S, relate this to what is known about stress correlates in Munda languages generally, and highlight the diversity of phonological realizations found in Austroasiatic languages of Mainland South-East Asia as well as in South Asian languages neighboring the Munda languages.

2.1 Sora stress correlates (Horo and Sarmah)

With a series of phonetic studies, Horo and Sarmah (2014, 2015) worked on the variety of Sora spoken in the Assam tea gardens. Speakers of Sora in Assam are recent migrants in the last century, and while D&S primarily refer to Orissa Sora, Horo's (2017b) PhD thesis includes an acoustic study of Orissa Sora, which shows that the two varieties do not differ significantly. As a result, findings in these studies serve to dismantle several claims about the structure of words and the vowel system of Sora made by D&S.

In Sora (whether Assam or Orissa as a whole), correlates of stress include pitch (F_0), whereby strong stress correlates primarily with higher relative pitch, duration (longer = stronger stress), and intensity (increase = stronger stress).[8] For Sora, Horo and Sarmah (2015:78) determined that "vowels (in Assam Sora) in the first syllables are more centralized" while "vowels in the second syllable are more representative of the canonical vowel space". This is exactly counter to what a 'falling' word rhyme would predict, where initial vowels are more canonical.[9]

Their analysis also examined Sora words where one might expect to get a different tendency, such as in an open syllable followed by a closed syllable. Even in these forms the data is counter what one might expect, such that "in V.CVC words, even though the vowel in the second syllable is in a closed syllable, the vowel in the first syllable is still significantly shorter than the vowel in the second syllable" (Horo and Sarmah 2015:79). In sum:

> "the second syllable is stressed in a disyllabic word in Assam Sora, characterized by greater pitch, longer duration, and by change in vowel quality… [and] the second syllable displays higher F_0 and duration of the vowel… [all of which] suggest [that it has] greater prominence" (Horo and Sarmah 2015:82).

Acoustically speaking, then, the phonetic details of Sora do not support previous assertions about falling word prosody of Sora disyllabic words and, by extension, Munda as a whole – which is a core/central assertion of Donegan and Stampe's (2004) thesis. Rather, the acoustic findings suggest that iambic words (right-headed) are the norm. These may combine in trochaic (right-headed) phrases (see below), but with sequences of iambic words. In other words, Sora (and other Munda languages like Remo, see below) appear to conform to a word prosody more in line with other AA languages (and likely an "old" inherited structure).

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[8] Horo (2017a, 2017b) demonstrates that there is dialectal variation in Assam Sora in some details, such that while Lamabari Assam Sora does not clearly use F_0 differences to differentiate word stress in disyllabic words, Koilamari Assam Sora and Raiguda Orissa Sora do use F_0. However, in terms of the major findings regarding placement of stress in disyllables, all varieties are shown to be similar, and we discuss these studies below.

[9] They go on to demonstrate that "(t)he first syllable has statistically significant lower F_0 and maximum F_0 than the second syllable" (Horo and Sarmah 2015: 80). They also state that "(t)he vowel space in initial syllables is reduced. …the average F_0 and maximum F_0 of the second syllables is higher" (Horo and Sarmah 2015: 82). Note however that low pitch may signal prominence in other Munda languages like Kharia, mentioned further below.

2.2. Munda word-hood

The primary examples used by D&S are of attested polysynthetic words in Sora, which they state show a "falling" contour. There are inherent issues with the use of this data, since it is not known how the words were recorded. If in isolation, phrasal prosody and/or utterance intonational contours may be at play in addition to (or exclusive) to word-level prosodic features. Even if in a frame removed from edge effects, e.g., "I ___ said", this is an inherently contrastive position and cannot be considered to be fully independent from potential information structure effects of intonation.

Moreover, their analysis does not align with what speakers of the language seem to conceive of as a 'word'. In a test of word-hood in Sora conducted by Anderson and other researchers, native Sora speakers with knowledge of transcription of their mother tongue (in different orthographies) were asked to listen to sequences recorded from other speakers and to transcribe the words in the recording. The speakers consistently wrote combinations of characters that decomposed morphological words into smaller units. While not fully conclusive, this suggests a strong tendency to correlate iambic structure to the unit 'word'.[10]

Put differently, large morphological words are often conceived of by Sora speakers as sequences of iambic phonological words, with certain prosodically weak elements perceived as permissible (but unstressed) in words as well. Sora has long been recognized linguistically for its large morphological words with lots of internal complexity. However, the constructs that many linguists consider words are recognized by Sora speakers as phrases. Where a linguist might transcribe them as a single unit, speakers break them into two- or three-syllable sequences of words with a rising contour. To illustrate, the following two examples (1-2) were given by Donegan and Stampe (2004:4) as particularly idiomatic renderings, but neither were considered single words when tested with native speakers (Anderson, field notes).

(1) *ədməltijdariŋdae*
əd-məl-tij-dar-iŋ-da-e
NEG-DES-give-rice-1.UND-AUX:TAM-3.ACT
'he does not want to give me rice'

(2) *əədnəlgəbrɔɟlaj*
ə-ədn-əl-gə/b/rɔɟ-l-aj
1PL-NEG-RECIP-shame/CAUS/shame-PST-1.ACT
'we did not shame each other'

The first form (1) was rejected when given without a subject pronoun, further underscoring its perception as a phrase/sentence and not a single word by native Sora speakers. It was repeated as follows (3).

(3) *anin* *{[əb-mə́l]$_{pw}$+[tijg-dar-íŋ]$_{pw}$=[dá-j]$_{pw}$}$_{mw}$*
3.PRON NEG-DES=give-rice-1.UND=AUX:TAM-3.ACT
'he does not want to give me rice'

The second word (2) was also rejected as one phonological word, despite being a morphological word conceptually. In this case the sequence of '1pl' and 'neg' marker at the beginning were reduced to a single element, suppressing the subject marker (4). In Gajapati Sora, there appears to be one prefix slot now shared

[10] A nearly identical pattern is observed in Kherwarian languages, specifically Mundari, Ho, Birhor, Bhumij, Kera' and Santali, where linguistically trained native speakers took part in a series of transcription exercises. Long morphological complexes were almost invariably written as sequences of disyllabic or maximally trisyllabic units. Given that Sora and Kherwarian languages have the most complex morphology of all Munda language subgroups and in theory could produce the longest morphological words, this is highly suggestive that a disyllabic or trisyllabic unit 'feels' most like a 'word' in Munda languages as a whole. While neither test has been adequately pursued nor quantitatively assessed, anecdotal skewing towards disyllabic words (with some trisyllabic sequences) in both of these contexts suggest that a more systematic implementation of such a test would support native speaker intuitions of di- or tri-syllabic wordhood.

between the plural subject markers and negative marker, with the negative taking precedence when both are allowed for semantically. This may be a change in the language since data collection in the 1930s-1960s.

(4) *{[(ə)-ədn-ál]$_{pW}$ [gə/b/rɔ́j]$_{pW}$ [l-á.j]$_{pW}$}$_{mW}$*
(1PL)-NEG-RECIP shame/CAUS/shame PST-1.ACT
'we did not shame each other'

Sora is not alone in showing this tendency in Munda: iambic words dominate and typify Gtaʔ (Anderson 2008, in preparation-a) and Gorum (Anderson and Rau 2008). Mundari (Osada 2008) and Kharia (Peterson 2011) are reported as having iambic words, and Santali (Ghosh 2008:30) and Juang (according to Patnaik 2008) are reported to have fixed second-position stress. In Remo, which has second/final position stress, a two-syllable word has final stress (5a), while a three-syllable morphological word may have second syllable stress and an optionally extra-metrical grammatical index in final position (5b) or the final syllable may be stressed; Gutob has a similar system (Anderson in preparation-b). Four-syllable Remo morphological words ($_{m}$w) first are assigned to phonological prosodic words ($_{p}$w) in an iambic pattern with primary stress on the second syllable of the first word, and secondary stress on the fourth syllable (5c-5d):

(5) a. *sum-óʔ*
eat-PST.TR/ACT
'she ate'

[sum-óʔ] $_{p}$w
- *
- **

b. *sum-óʔ=niŋ*
eat-PST.TR/ACT=1SG
'I ate'

[sum-óʔ=niŋ]$_{p}$w
- *=ø
-**=ø

c. *susúm=ɖen-t-ìŋ*
RDPL~eat=IPFV-NPST-1SG
'I am eating'

{[*susúm*]$_{p}$w=[*ɖen-t-ìŋ*]$_{p}$w}$_{m}$w 'I am eating'
- * - *
- ** - *

d. *a-goi=tə-no*
NEG-die-NPST-2SG
'you do not die'

{[a-gói]$_{p}$w=[tə-nò]$_{p}$w}$_{m}$w 'you do not die'
- * - *
- ** - *

{[Right headed]$_{p}$w +[Left headed]}$_{m}$w

These facts run counter to D&S's claims regarding stress in Munda languages. Having said this, a review of literature on the Munda languages reveals mixed results when it comes to what has been reported regarding prominence or stress and its acoustic correlates in individual languages of the family, such that D&S are not entirely to blame for their conclusions. We summarize this diversity in Table 2 by language and source, including what is reported for the placement of prominence or prosodic contour in the language and its reported acoustic correlate. While this data and the analyses cited here deserve fuller treatment, we limit ourselves to making some general observations.

One observation is that not all the Munda languages are represented in this table, and for several languages in the table accounts and analyses differ or are couched in different terms. For Gutob, Judith Voß

(p.c.) identifies a LH prosodic contour with a primary correlate of pitch, while Griffiths (2008:639-40) cites Zide (1965:44) as stating that heavy syllables of the word are stressed, presumably based on quantity of morae. For Ho, Pucilowski (2013) identifies a trochaic stress pattern, while Anderson, Osada and Harrison (2008:204) state that the language exhibits initial stress – neither source identifies an acoustic correlate of this measure. For Juang there are two accounts (Patnaik 2008:513; Dasgupta 1978:20) that seem to contradict each other – one that identifies main stress on the second syllable (with a main correlate of pitch) and one on the first syllable. For Sora, the sources seem to identify the same correlates, but D&S claim that the language shows trochaic prominence, and Horo and Sarmah identify iambic stress.

Another observation is that for most of the languages listed here, it is not clear what the acoustic correlate of prominence is. So while for Remo, both Anderson and Harrison (2008:565) and Bhattacharya (1968:xxii) identify main stress as occurring on the second syllable of disyllabic words, neither explicitly state what the acoustic correlate of this stress pattern is (though for the former, given the section heading, we can guess that 'pitch' is intended). The lack of clearly identified correlates in the majority of sources is problematic for broad generalizations about stress or accent patterns in these languages.

Table 2: *Munda languages, stress patterns, and acoustic correlates*

Language	Reference/Source	Prominence placement	Correlate
Gorum	Anderson and Rau (2008:386)	final (closed syllables)	unclear
Gtaʔ	Anderson (2008:686)	final stress	pitch
Gutob	Judith Voß (p.c.)	LH prosody	pitch
Gutob	Griffiths (2008:639-40)	heavy syllables stressed	unclear
Ho	Pucilowski (2013)	trochaic	unclear
Ho	Anderson, Osada, and Harrison (2008:204)	initial stress	unclear
Koɽowa	Barker (1953?/nd:31)	final stress (on verb stems)	unclear
Juang	Patnaik (2008:513)	stress on syll 2	pitch
Juang	Das Gupta (1978:20)	stress on syll 1	unclear
Keraʔ Mundari	Kobayashi and Murmu (2008:169)	LH in disyllables	pitch
Kharia	Biligiri (1965:19-20)	initial stress	unclear
Kharia	Rehberg (2003:23-28)	initial accent	low pitch
Kharia	Peterson (2011:35)	LH prosody	pitch
Korku	Zide (2008:260)	final stress	unclear
Mundari	Osada (2008:104)	normally final for 2-syll	pitch (accent)
Mundari	Langendoen (1963:14-15)	final if open	unclear
Mundari	Cook (1965:100)	final (if closed), else initial	pitch (accent)
Mundari	Sinha (1975:39)	second syllable (if heavy)	unclear
Remo	Anderson and Harrison (2008:565)	stress on syll 2	unclear
Remo	Bhattacharya (1968:xxii)	final stress	unclear
Santali	Ghosh (2008:30)	stress on syll 2	unclear
Santali	Neukom (2001:8)	initial unless syll 2 is heavy	unclear
Sora	Donegan and Stampe (2004)	trochaic	pitch, ints, dur
Sora	Horo and Sarmah (2015), Horo (2017a, b)	iambic	pitch, ints, dur

A third observation is that some languages in the table do not have easily comparable correlates of stress or accent – for Kharia, two sources identify a similar pitch pattern (LH) across words, but Rehberg (2003:23-28) states that the initial accented syllable is identified by its low pitch. If low pitch is the main

correlate of prominence in one language, and high pitch is the main correlate in another (such as Sora), this complicates the picture and adds another layer of historical development that must be accounted for.
From this brief summary we can see that the systems of stress assignment in Munda are both varied and subject to considerable analytical debate, with some seemingly incompatible analyses being offered for the same language by different researchers. But whatever the actual phonetic and phonological details are, rhythmic holism as a one-time parametric reset affecting all Munda languages is untenable, given 1) the diversity of prosodic patterns reported and 2) that some languages do not appear to have ever undergone phonological restructuring away from final or second-syllable stress at the word level (Gorum, Gtaʔ). It is clear that a systematic family wide survey of prosodic domains will be necessary to fully resolve this situation within Munda, and that Munda researchers need to work toward being able to compare the same kinds of things, possibly by identifying acoustic correlates of the features they describe.

2.3 Areal and genetic over-generalizations

Among the more obvious over-simplifications presented in the theory of rhythmic holism *à la* D&S are the lack of monolithic featural/structural complexes defining each of the groups. In other words, the alleged areal split is far from as clear-cut as implied in the work of D&S. As demonstrated above, Munda is not a monolithic entity in terms of the features they describe, and thus the distributional data at minimum require a diachronic periodization whereby different languages and sub-groups have accommodated to *local* norms or have undergone unique (simultaneous) developments through independently attested processes of borrowing/copying or metatypic shift. The diversity identified above cannot simply be explained via vague and semi-mysterious macro-areal processes of drift, nor a one time parametric re-setting of 'rhythm' showing pattern-copying at the proto-Munda level. Moreover, the non-Munda Austroasiatic languages (section 2.3.1) and the South Asian languages neighboring Munda (section 2.3.2) likewise do not represent a single monolithic, unvarying entity in terms of various phonological features.

2.3.1 Diversity in Austroasiatic

In terms of phonological structures and prosodic features, Mainland South-East Asian (MSEA) languages tend to a similar profile (c.f. Enfield 2005) that likewise typifies the AA languages spoken there: sesquisyllabic word structures with significant distributional restrictions on the nature and type of elements permitted in the minor syllable, and final stress on the major syllable. However, while in broad strokes these appear to be similar or identical, there is significant variation as to the nature of the restrictions on the segments and even on the structure of the minor syllables. For example, Schiering et al. (2007) identified different kinds of minor (and major) syllable templates in the AA languages they surveyed – to this we can add data from other Austroasiatic branches that they did not survey (Table 3).

Along with these clear differences in syllable template, AA languages also differ regarding which consonants can occupy C_1, C_2 or C_3 positions in either the minor or major syllable. Not all core MSEA languages belonging to AA require reduced vowels in minor syllables, but some rather restrict the set of full vowels that can occur in the initial syllables of words – a situation that is also found in some Munda languages. Thus, as in Munda, weak+strong word profiles endure even if the specific restrictions on the 'weak' syllables are not as pronounced or as strict as they are in many of the AA languages found in the core regions of MSEA.

Table 3: *Major and minor syllable templates in some AA languages*

Language	AA Branch	Minor syllable	Major syllable
Schiering et al. (2007):			
Khasi	Khasian	CC./Cə	(C)CCVVC
Khmu	Khmuic	CC. (Cə)	CCVVC
Semelai	Aslian	CəC/CuC	CVC
Car	Nicobarese	[NO]	CVC
Mon	Monic	Cə	C(C)V(C)
Vietnamese	Vietic	[NO]	C(w)V(V)(C)
Pacoh	Katuic	CV(C)	(C)CV(V)(C)
Cambodian	Khmeric	Cə	C(C)(C)V(V)(C)
Chrau	Bahnaric	CV	(C)(C)CV(C)
Other sources – Premsrirat and Rojanakul (2015); Li and Luo (2015); Deepadung, Rattanapitak and Buakaw (2015):			
Chong	Pearic	C(C)ə(C)	C(C)V(C)
Bugan	Mangic	[NO]	CV(V)(C)T
Dara'ang Palaung	Palaungic	CV/N	C(C)V(C)

Prosodic words in eastern AA languages tend to be maximally disyllabic in structure, which is also true of several Munda languages, regardless of how many syllables a morphological 'word' might entail. However, as in some Munda languages, there are several non-Munda AA languages which have words longer than two syllables. So for example, Car Nicobarese permits four-syllable words, as does Aslian Semelai, while Aslian Jahai can have four-syllable words of the structure C.C.C(V)(C).CVC, e.g., *tbtadɔ?* [REL-PROG-wait] 'waiting' (Kruspe, Burenhult, and Wnuk 2015:423).

In terms of prosodic systems, Schiering et al. (2007:5) find word stress and phrasal stress to be final in Khasi and in Mon. However, Schiering and van der Hulst (2010:592) state that evidence for word stress is weak in a number of Austroasiatic languages included in the original StressTyp database:[11] they describe the status of word stress in Sedang as unclear and in Khmu' and Khmer as debatable, and consider the status of word stress in Khasi as highly debatable. Thus, we can conclude that non-Munda Austroasiatic languages (D&S's 'Mon-Khmer') are not a monolithic entity with regards to syllable structure, nor word (and possibly phrasal) stress. Given that Munda shows analogs to many of these features, the strict areal dichotomy of Munda vs. non-Munda in Austroasiatic, as asserted by D&S, cannot be maintained.

2.3.2 Diversity in South Asian languages

Languages in other language families of South Asia also do not present a monolithic areal profile prosodically. Indo-Aryan and Dravidian are neither identical nor uniform in their prosodic systems, as cogently demonstrated for Indo-Aryan by Khan (2016). In South Asian languages there are conflicting tendencies that further draw into question the notion of 'rhythmic holism'. South Asian languages are supposed to have "falling" rhythm (initial stress and a fall across the utterance), but Khan (2016:23-24) speaks of the fact that South Asian Languages [SALs] "are generally considered to have no lexical contrast in prominence ("stress") placement, and there are in fact no clear signs that stress is even a phonetic property of SALs at all" but are characterized by "repeating rising contours (RRCs) built from L tones on the left edge and H tones on the right edge of each content word, followed by a final boundary tone marking the edge of the intonation phrase (IP)". This supports Ladd's (1996) assertions of "Bengali (and probably most of the languages of India)" as representing "non-stress accent" with "postlexical pitch only".

[11] http://fonetiek-6.leidenuniv.nl/pil/stresstyp/stresstyp.html , see also http://st2.ullet.net/

There is clear evidence in the major South Asian language families (Indo-Aryan and Dravidian) for the prominence of the first syllable in disyllabic words. In Bengali (Dasgupta 2003; Khan 2008) the first syllable shows more vowel contrasts, while short [i, u, a] are centralized in non-initial position in Tamil (Keane 2004, 2014).[12] Intonational phenomena, on the other hand, can be quite varied across the major South Asian languages. Thus with respect to Indo-Aryan vs. Dravidian features, Khan (2016:30-31) states:

> "...the H target is typically AP-final in the Indic SALs studied (Assamese, Bengali, Nepali, Hindi), in line with the majority of previous work on SAL intonation; this can be considered the "typical" pattern for SALs. For Telugu and Tamil, however, the peak of the H target is (also) typically reached on the second syllable (Tamil) or third vocalic mora (Telugu), suggesting a complex pitch accent (L*+H) with a language-specific alignment specification for the trailing tone. In fact, I propose that Tamil and Telugu have more complex tonal templates available than for the other SALs studied, with the option of having two H targets per RRC, one closely following the prominence and another near or at the phrase boundary"

Within Indic and Dravidian there is non-trivial intra-family variation with respect to the realizations of the areally common repeated rising contours intonational patterns. Khan (2016:35) summarizes his study as follows:

> "The A[ccentual] P[hrase]'s L tone marks the prominent syllable, which can be non-initial in Hindi; Assamese shows more variation. Similarly, the AP's H tone can mark the right edge (Assamese, Hindi), the long vowel closest to the right edge (Telugu), the tail of the prominent syllable, or some combination of these, in alternation (Bengali) or simultaneously (Tamil)."

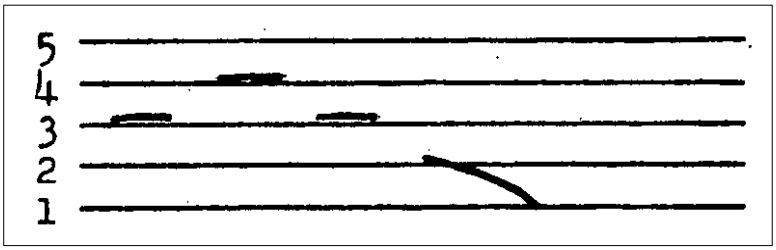
Data like this runs counter to a narrative of rhythmic holism as an organizing feature that defines South Asia vs. MSEA. The identification of 'falling' vs. 'rising' rhythmic patterns in these areas that account for a wide range of phonetic, phonological, morphological and syntactic features, is similarly problematic.

2.4 Phrasal prosody in relation to D&S's claims

Phrasal prosody generally in the Munda and non-Munda Austroasiatic languages deserves further investigation. As noted above and described further below in our pilot study, in two- and three-syllable units (words), pitch contour in Sora tends to rise to the end of the unit, which corresponds to the rising rhythm of D&S (or the 'Mon-Khmer' model). With longer units of four, five, and six syllables, however (described briefly below), there is often a peak at the second or third syllable, and then a fall to the end of the unit. If we simply consider pitch contour of the unit (which possibly aligns with grammatical phrases), Munda languages seem to show a "falling" pitch pattern after an initial rise, based on impressionistic observations.

This pitch contour in phrases is not simply a Munda phenomenon within Austroasiatic, however, as it also occurs in Khasian languages which belong to the "Mon-Khmer" group that D&S place in opposition to Munda. For Khasi, this was reported in the middle of the last century by Rabel (1961:32), who states that phrases "are characterized by a special pitch contour, which differs from the word pitch contour, which is basically 3:4:3:2-1" (Figure 2).

Figure 2: *Khasi pitch contour (reproduced from Rabel 1961)*



[12] As reported above, this is the mirror image of what Horo (2017a,b) found for Sora, where the second syllable in disyllables is more canonical and shows less centralized vowels. As we reviewed for Austroasiatic more generally, this situation precisely reflects the minor syllable : major syllable distributional properties that typify non-Munda Austroasiatic languages (Schiering and van der Hulst 2010).

The fact that this observation (albeit impressionistic) was missed or ignored by D&S is concerning, since by their terminology Khasi shows the same falling phrasal contour as Munda. Based on their argumentation, this contradicts their claim that "Mon-Khmer" languages (which include Khasi) show a rising contour in the phrase. The analysis of pitch is what we turn to in the following section, starting with pitch contour of words.

3. Instrumental analysis of word pitch

The carefully designed study by Horo (2017b) samples multiple varieties of Sora and conducts statistical analysis on a large number of recorded samples from multiple speakers of each variety. His study shows that in Sora the concept of 'word' aligns with units that are primarily disyllabic and have iambic stress patterns, with primary acoustic realizations of stress being pitch, duration, and intensity. Our study offers some initial data on three geographically disparate Austroasiatic languages. The data presented here is not intended to be conclusive, but rather to show that more research needs to be done in order to clarify the similarities and differences in word and phrasal prosody in Austroasiatic languages. We believe that this data necessitates significant refinement to the approach of (contact-triggered) restructuring that has occurred and is still ongoing among minority languages of India belonging to the Austroasiatic family.

We must also acknowledge that there are significant shortcomings with the quality of the data to be analyzed here. We have yet to design a controlled, laboratory-appropriate context for recordings of the languages involved that recognizes the shortcomings inherent in many previous phonetic and phonological analyses, as cogently pointed out by Roettger and Gordon (2017), where phrasal intonation is likely being measured. We also note that while Horo and Sarmah (2015) and Horo (2017a, b) demonstrate a clear iambic structure for disyllabic stems/words in Sora, there may be confounds. The recordings underpinning their analyses are of words in a standard frame, potentially a focus position where phrasal and information structure intonational dynamics may be in play. Our own data on connected speech suggests that there is a rise and then a fall in Sora units of 5-7 syllables. The relationship of intonation with information structure is still not well-explored in Sora, so it is unclear what effect such features have had in the existing research.

We lack recordings in frames where a different word has been focused, as suggested by Gordon and van der Hulst, that eliminates this potential problem. A project to fully document the prosodic domains and units in Sora is being planned at present, so for now we must be limited to some preliminary observations. Thus, in a sense, this paper should be viewed as justification for a future research agenda.

Given these caveats, below we give example pitch traces of Sora words in comparison with Pnar and Lawa. Our goal in this section is to offer visible acoustic evidence regarding the correlation of pitch with what researchers on these languages say about the realization of stress. We will then see what generalizations can be made about word prosody in these languages, and whether any of these generalizations match the statements made by D&S. All the data presented in this pilot study is available for download on GitHub.[13]

We have discussed the correlates of stress for Sora (and Munda generally), but a few words about word stress in Pnar and Lawa are in order, to justify our acoustic examination of pitch. In Pnar (Ring 2015a, b), as in Khasian languages generally (Rabel 1961; Nagaraja 1985), word stress has been reported as iambic, where strong stress falls on the final syllable of a word. The primary correlate of word stress in Pnar is pitch (F_0), such that strong stress is marked primarily with higher relative pitch. Other correlates of stress include duration (longer = stronger stress) and intensity (increase = stronger stress).

In Lawa stress is also tied to the syllable, whereby final syllables of words receive the strongest stress (Mitani 1978; Blok 2013). The primary correlate of word stress in Lawa is reported as pitch, such that strong stress corresponds to higher pitch. Falling pitch is reported in Lawa on words in isolation, but generally not in phrases or words uttered in context – this observation led Mitani (1978) to conclude that lexical pitch was non-phonemic in Lawa, and that falling pitch contours were an effect of list intonation applied to lexical roots that were not considered phrases.

Our data sources are three recordings from fieldwork. The recordings in Sora and Pnar are stories of 5 minutes in length, while the Lawa story was about 2.5 minutes long. Each story was by a single male speaker, transcribed, translated, and interlinearized for the purpose of grammatical analysis. For this initial pilot study we re-annotated each of the stories, using Praat TextGrids to segment word and phrase utterances

[13] https://github.com/lingdoc/data_AA_prosody_paper

by syllable number. Data from a single speaker is not sufficient to generalize to all speakers of these languages, but we present it here due to the complete lack of such annotations in other AA research.

Below we present pitch traces in each language, focusing on words between 2-5 syllables. Unfortunately, due to constraints of time and our existing data, we could not control for word classes or constructional features. Instead, we present the pitch of one word of *n*-syllables for each language that is representative of the pitch of all such items generally, as well as a normalized pitch trace for words of *n*-syllables using a Praat script for extraction, normalization, and plotting of F_0 (Ring 2017), with automatic detection of F_0 to between 75 and 300 Hz. Table 4 presents the number of words by syllable length for each.

Table 4: *Number of words by syllable for Sora, Pnar, Lawa*

Syllables:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Tokens**	**Syllables**
Sora:	54	198	168	111	44	23	2	1	601	1778
Pnar:	591	386	76	36	7	1	0	0	1097	1776
Lawa:	223	69	1	0	0	0	0	0	293	364

As can be seen from Table 4, the distribution of syllable types is not equal in the samples we investigated. While total number of syllables was comparable between Sora and Pnar, the Lawa sample contained fewer tokens and syllables overall, despite only being two minutes shorter. The samples also differ in terms of the relative number of syllables in a word – the Sora sample contains many more words with large syllable counts, while the Lawa sample contains mostly monosyllabic words and some disyllabic words.

3.1 Sora word pitch

Sora words in the single text we annotated include words between 1 and 8 syllables in length. Simply based on the number of words in each category (Table 2), we can see that two- and three-syllable words dominate, and that there is a significant downward trend (in terms of numbers of instances per category) for words of more than 5 syllables. Since our focus is to assess the claims of D&S in relation to the pitch contour of Munda words, below we highlight the pitch patterns of 2- to 5-syllable words within our Sora text.

3.1.1 Sora 2-syllable words

Two-syllable words in the Sora text we annotated make up the largest category of words, with 198 instances. While there is some variation, the primary pitch pattern of these words is of increasing pitch to the second syllable. In Figure 3 we see this pattern exemplified by the numeral *bagun* 'two'.

Figure 3: *Sora word pitch in 2-syllable word* bagun *'two'*

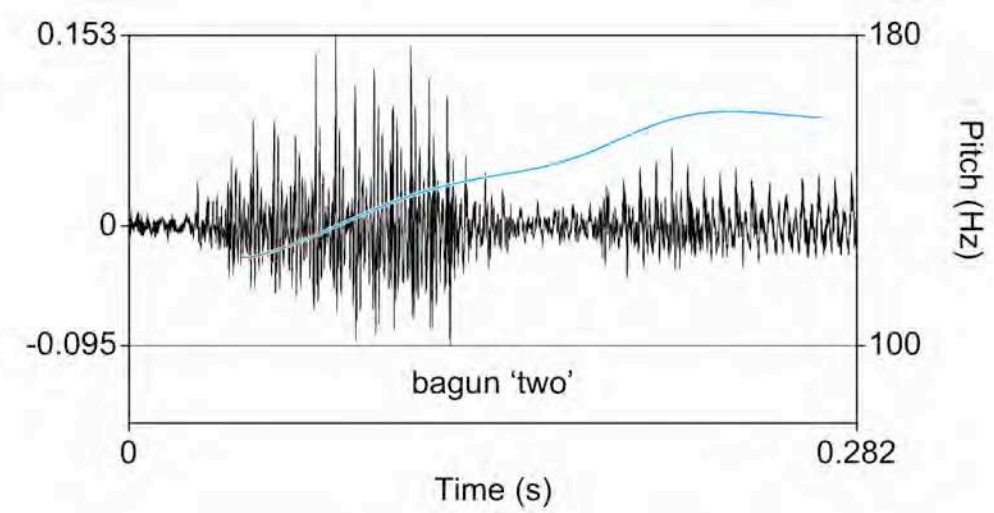
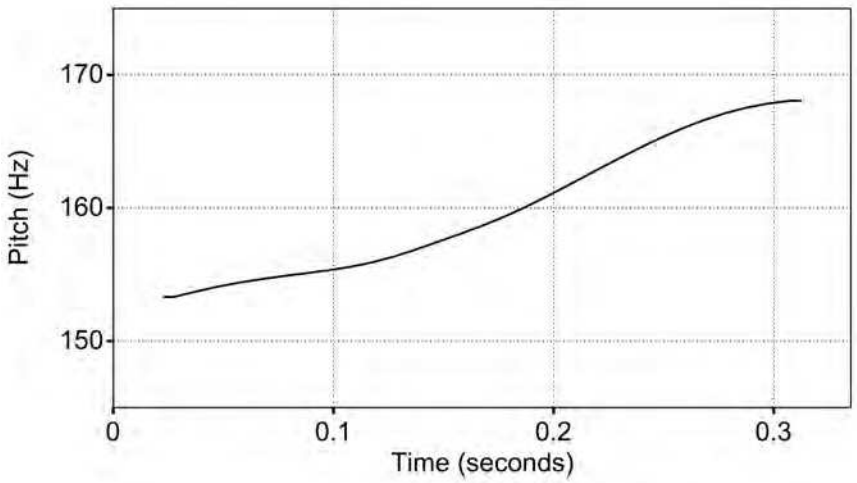


Figure 4 below displays the normalized pitch contour of 2-syllable words in our sample, which also rises across the duration of the two-syllable words, with an average length of 300 milliseconds.

Figure 4: *Sora normalized word pitch in 2-syllable words (198 instances)*

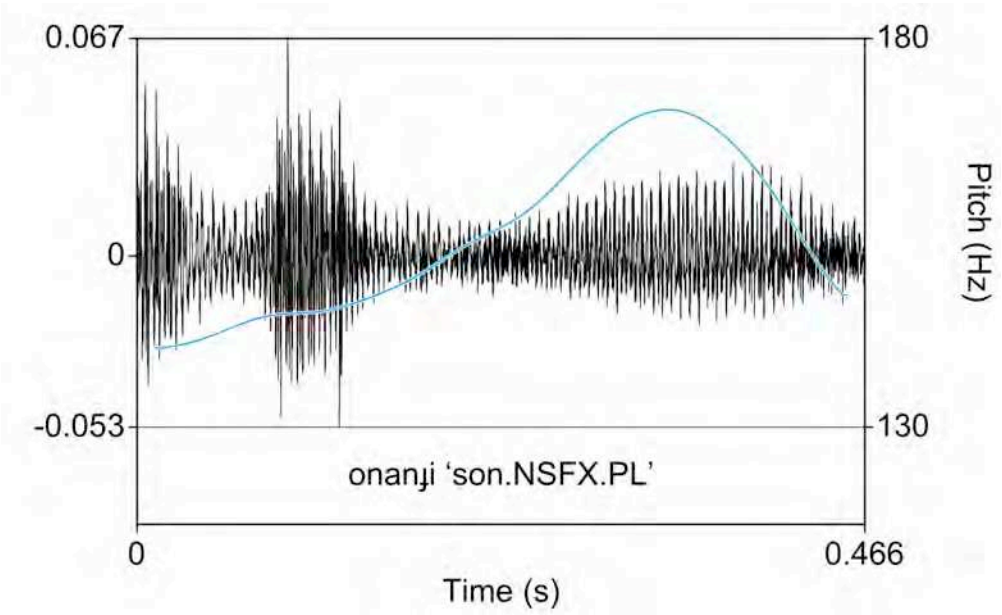


We acknowledge that a normalized pitch trace does not do justice to the range of variation in the data. However, this observation of the pitch in Sora two-syllable words aligns with Horo's (2017a, b) observations, and seems to indicate a clear tendency toward iambic stress in Sora disyllables.

3.1.2 Sora 3-syllable words

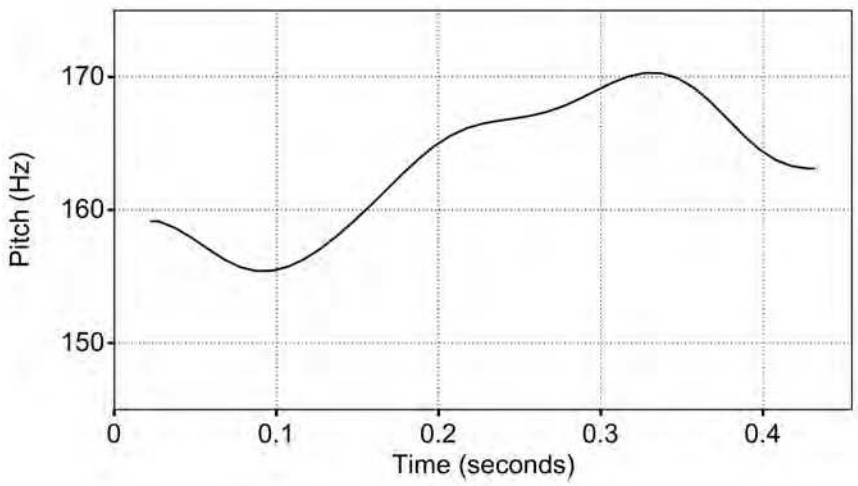
Three-syllable words are similarly well-represented in our Sora text, with 166 items. The majority of these words show a rise in pitch to the final syllable, as in the word *onaŋi* 'son.NSFX.PL' in Figure 5 below.

Figure 5: *Sora word pitch in 3-syllable word* onaŋi *'son.NSFX.PL'*



Creating a normalized pitch trace of all the words with three syllables in our text (Figure 6) illustrates that these words tend to have a rising pitch contour to the final syllable before a fall that corresponds with cessation of sound as the speaker prepares for the next word.

Figure 6: *Sora normalized word pitch in 3-syllable words (166 instances)*



3.1.3 Sora 4-syllable words

There are 113 instances in our text of Sora words with four syllables. Here we found more variation in pitch patterns. In Figure 7 below, of the word *adaŋgaɽa* 'PFX-young', we can see a high initial pitch followed by low pitch in the second and third syllable, rising to end with mid-level pitch on the final syllable. In Figure 8, however, the word *dakuliŋi* 'be.like.that' shows an initial mid-level pitch, high pitch on the second syllable, a sharp fall in the third syllable, and then a slight rise to the final syllable.

Figure 7: *Sora word pitch in 4-syllable word* adaŋgaɽa *'PFX-young'*

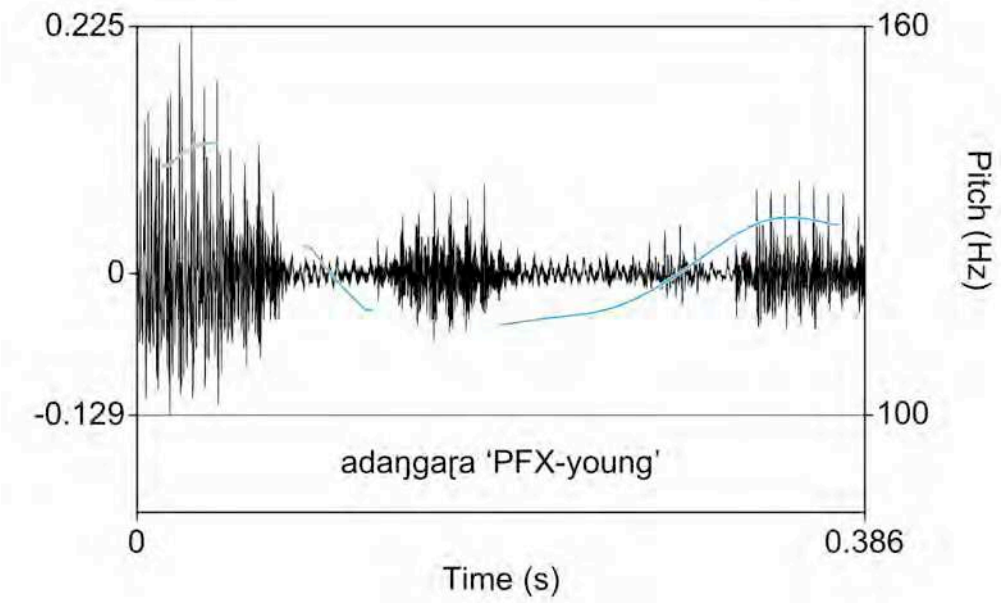
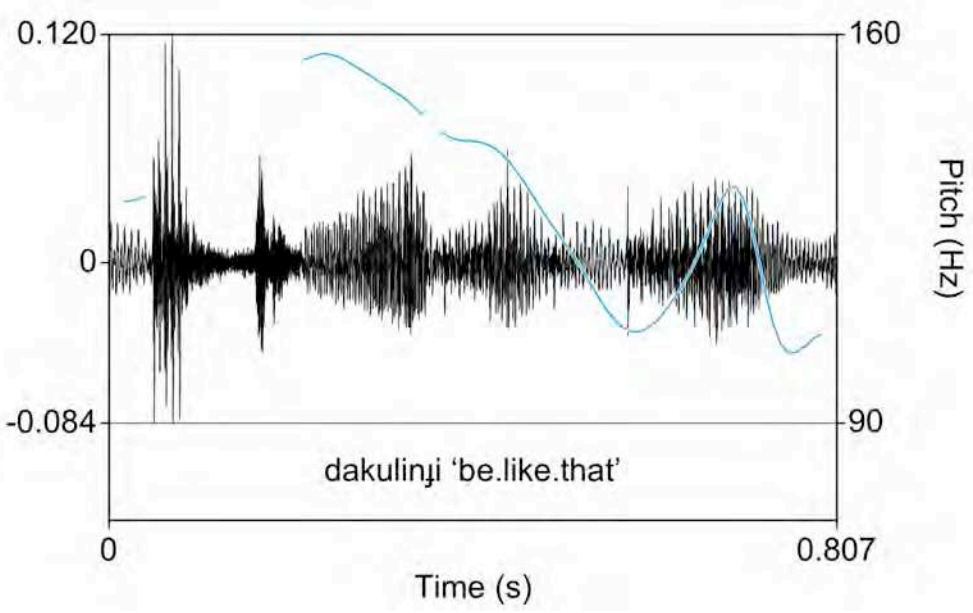
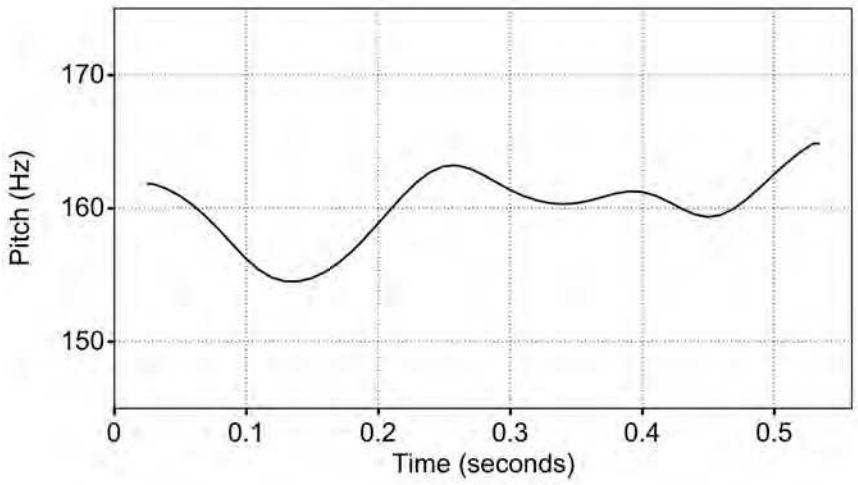


Figure 8: *Sora word pitch in 4-syllable word* dakulinɟi *'be.like.that'*



This is reflected in our normalized pitch trace (Figure 9), where we can see that the variability in four-syllable words, when normalized, leaves us with a pitch contour that shows no clear rises or falls and in relation to the previous normalizations of pitch is rather flat. We discuss this pattern below in our summary of Sora word pitch patterns.

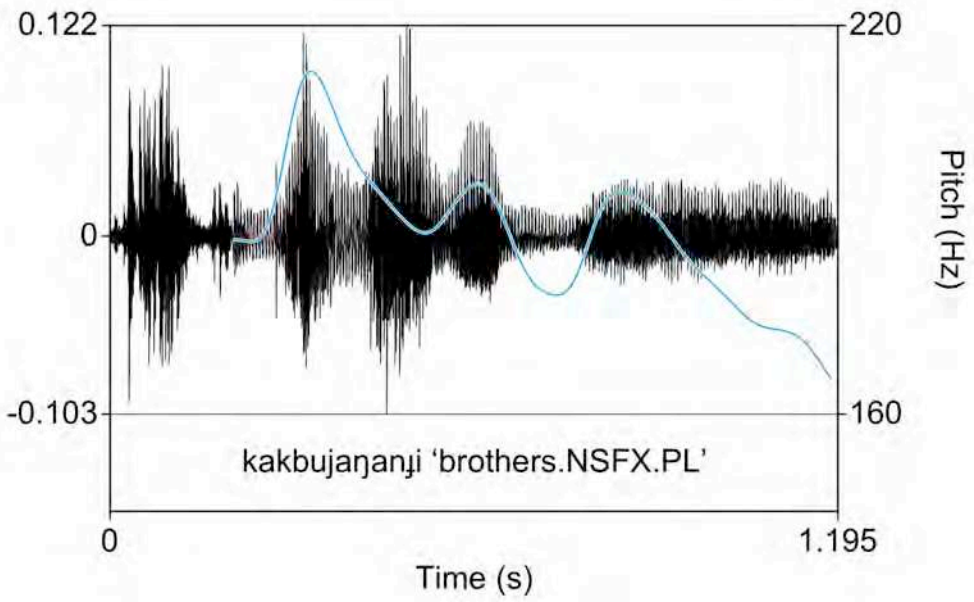
Figure 9: *Sora normalized word pitch in 4-syllable words (113 instances)*



3.1.4 Sora 5-syllable words

Interestingly, Sora words in our sample with five syllables do not show the same degree of variability as four-syllable words. Here we see a falling pitch contour, illustrated in Figure 10 by the Sora word *kakbujaŋanɟi* 'brothers.NSFX.PL'. Even more interesting, the highest pitch is generally recorded on the second or third syllable, and there is then a fall (punctuated by several height adjustments) from the highest point to the end of the word.

Figure 10: *Sora word pitch in 5-syllable word* kakbujaŋanɟi *'brothers.NSFX.PL'*

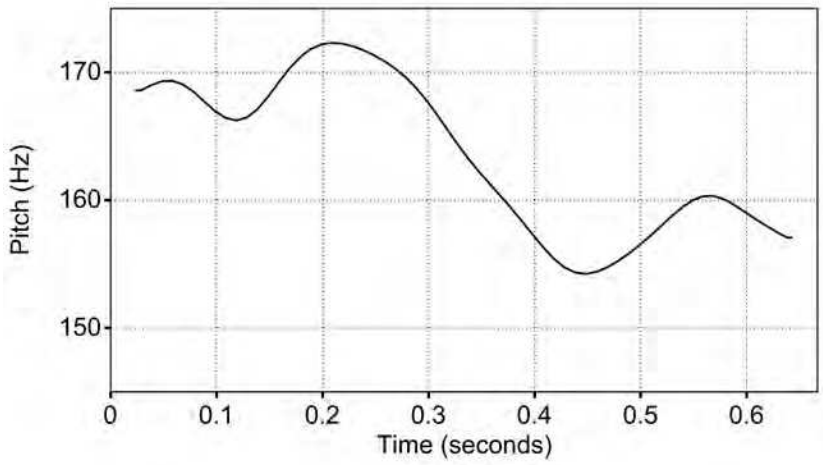


With only 44 instances of words with five syllables in our sample, the normalized pitch trace of these words (Figure 11) is not entirely conclusive, but illustrates an interesting trend. Here we see a slight rise to the second (or third) syllable, and then a fall to the end of the word, punctuated by slight peaks in pitch.

3.1.5 Sora word pitch summary

We can draw the following generalizations from our Sora data. First, a relatively stable pitch pattern seems to be present in words of two and three syllables, where pitch rises to the second or third syllable. Four- and five-syllable words, however, show no clear pitch prominence in four-syllable words, and for five-syllable words an initial rise in pitch to the second syllable before a fall in pitch to the end of the word.

Figure 11: *Sora normalized word pitch in 5-syllable words (44 instances)*



There are three possible reasons for the difference in pitch pattern for Sora words of four and five syllables. The first is that there are not enough tokens for pitch normalization to clearly reflect a pattern. The second is that longer words in Sora are more likely to have multiple affixes, with both prefixes and suffixes. This highlights a need to investigate the effect of affixation on realizations of word pitch/stress in Sora.

The third possibility is that such words are more likely to be composed of several phonological words, each with a prominent syllable. Longer words may thus show pitch prominence differences from other words of the same length, making generalizations more difficult. Words of fewer syllables are more likely to be

composed of single phonological words and show a dominant/primary pitch pattern. This also has implications for pitch in Sora phrases, discussed after we describe word pitch in the other languages.

3.2 Pnar word pitch

For Pnar, the majority of words in our sample were monosyllables. There were a large number of disyllables, and enough three- and four-syllable words to make observations. However, there were only seven five-syllable words, and a single six-syllable word, so below we describe words between 2 and 4 syllables.

3.1.1 Pnar 2-syllable words

The Pnar sample contains 386 words of two syllables. Pitch tends to increase in these words to the second syllable. In Figure 12 we see this in the word *ka=tʰaw* 'place'.

Figure 12: *Pnar word pitch in 2-syllable word* ka=tʰaw *'place'*

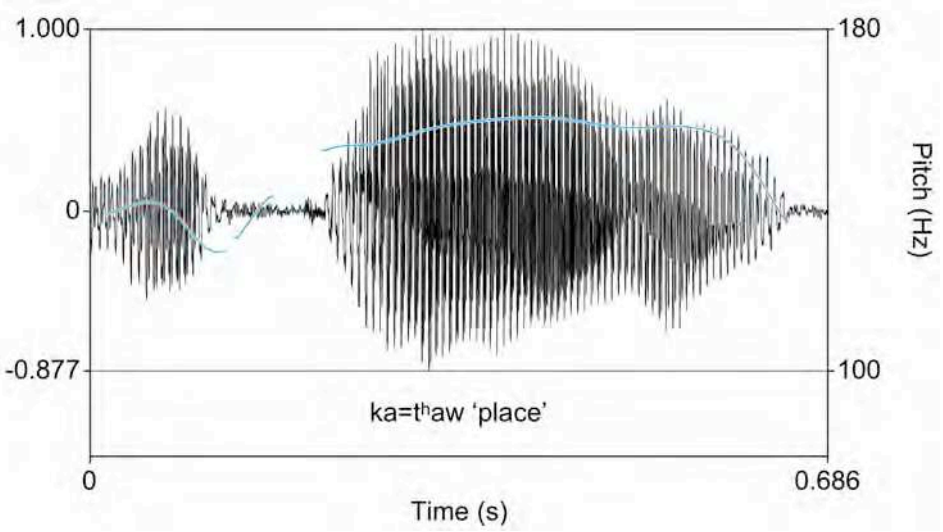
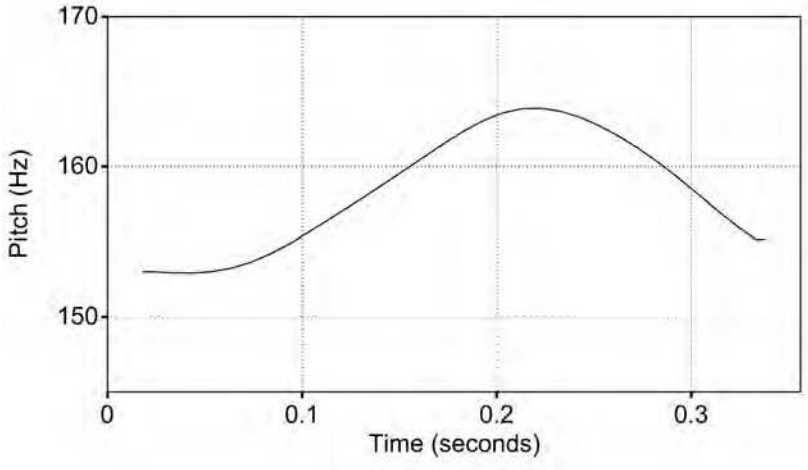


Figure 13 displays the normalized pitch contour of these words, which rise to the second syllable.

Figure 13: *Pnar normalized word pitch in 2-syllable words (386 instances)*



3.1.2 Pnar 3-syllable words

Three-syllable words are less well-represented in the Pnar text, with 76 items. The majority of these words also show a rise in pitch to the final syllable, as illustrated by the word *nɔŋhikaj* 'teacher' in Figure 14 below. Creating a normalized pitch trace of all the words with three syllables in our text (Figure 15) illustrates that these words tend to have a rising pitch contour to the onset of the final syllable before a fall to the end.

Figure 14: *Pnar word pitch in 3-syllable word* nɔŋhikaj *'teacher'*

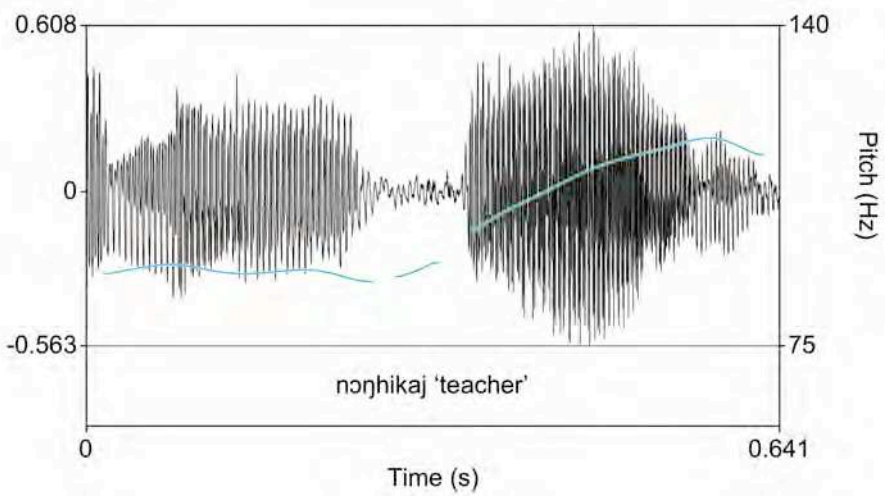
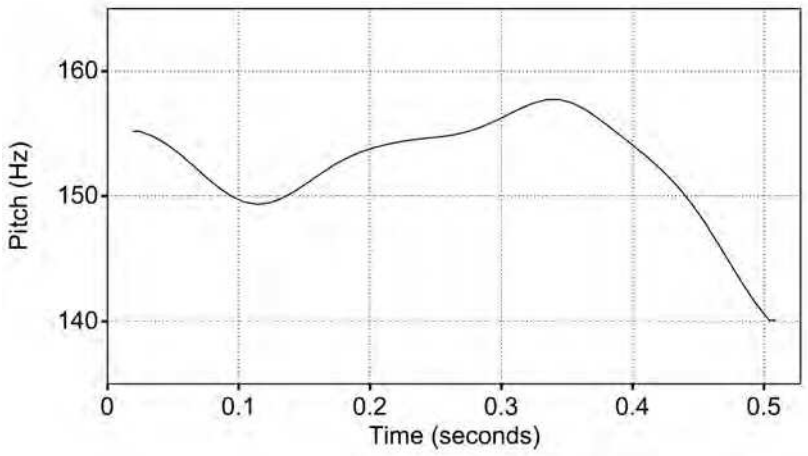


Figure 15: *Pnar normalized word pitch in 3-syllable words (76 instances)*



3.1.3 Pnar 4-syllable words

In Pnar words with four syllables we found more variation in pitch patterns. In Figure 16, *ka=ʤiŋjarap* 'the help' shows a rising pitch contour, while in Figure 17 *ka=ʤiŋjasen* 'the gathering' shows two peaks.

Figure 16: *Pnar word pitch in 4-syllable word* ka=ʤiŋjarap *'the help'*

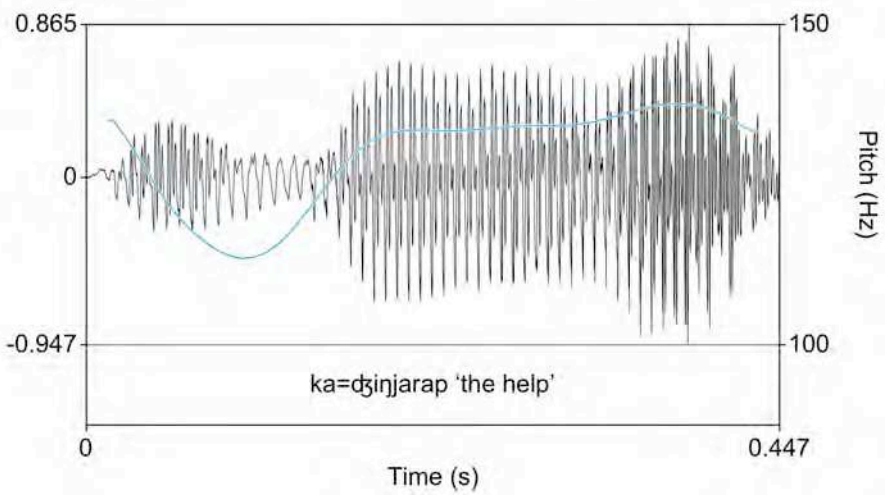


Figure 17: *Pnar word pitch in 4-syllable word* ka=ʤiŋjasen *'the gathering'*

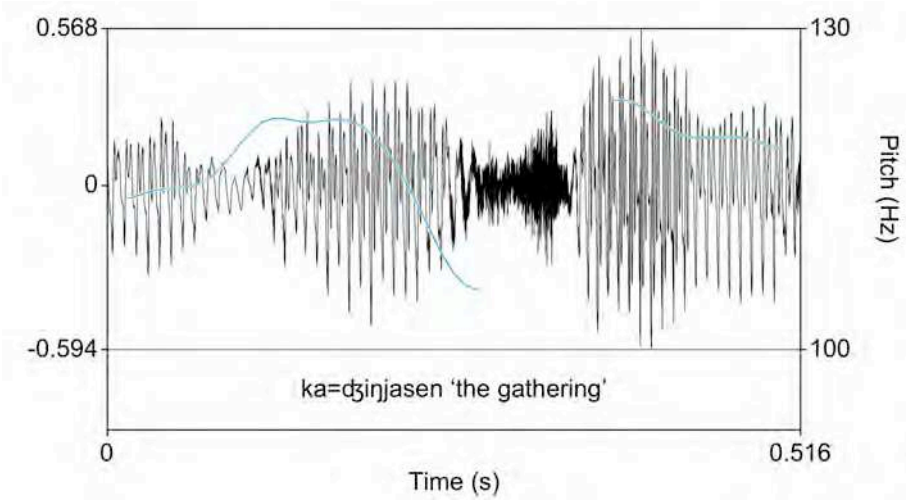
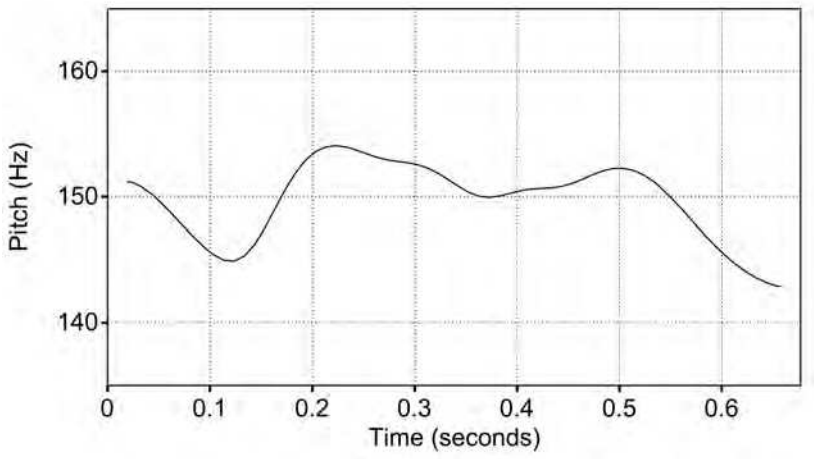


Figure 18: *Pnar normalized word pitch in 4-syllable words (36 instances)*

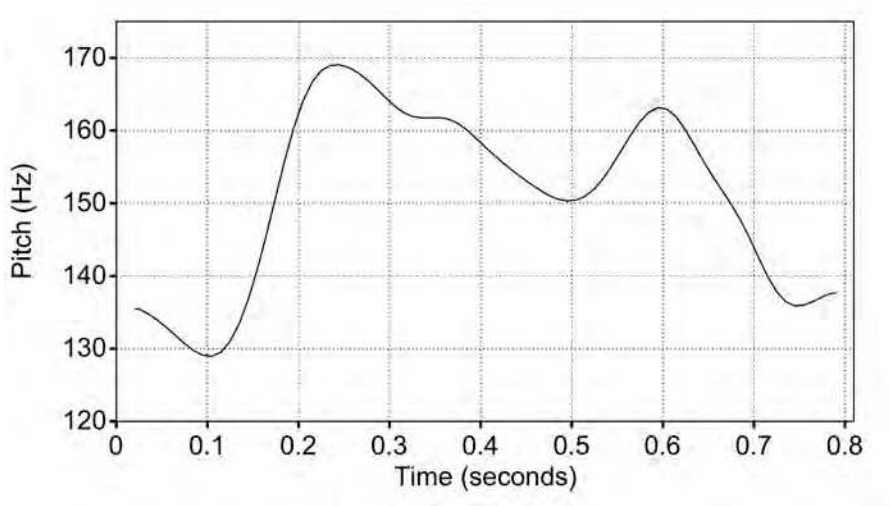


The normalized pitch trace of these four-syllable words (Figure 18), shows a pitch contour with two peaks. Occurrence of the two peaks where one would expect a second and fourth syllable onset may indicate that Pnar words of four syllables are composed of two (or more) phonological words, with pitch indicating relative prominence of their respective syllables.

3.1.4 Pnar 5-syllable words

Pnar words with five syllables in our sample are represented by only seven instances. In nearly all cases these are borrowed words (primarily from English). Exceptions to this rule are Pnar place names, of which there are two five-syllable examples in our data. In Figure 19 we show the normalized pitch pattern of Pnar five-syllable words. Here we see two pitch peaks, similar to those in four-syllable words, but there are too few tokens to offer meaningful information.

Figure 19: *Pnar normalized word pitch in 5-syllable words (7 instances)*



3.1.5 Pnar word pitch summary

What we can say for the pitch of Pnar words based on this data is somewhat similar to what can be said regarding Sora. In syllables of two and three syllables, there is a general rise in pitch to the final syllable. With four- and five-syllable words there is much more variation. While this may be clearer with more data, there are two possibilities that arise from our current observations in terms of variation in words with more syllables: the interaction of affixes and the alignment of phonological words with syllable structure.

Pnar is primarily a prefixing and procliticizing language (Ring 2015a,b). The majority of the four-syllable words in our sample have clitics and/or prefixes. The examples in Figures 16 and 17 are both nominalizations formed by a clitic and two affixes prefixed to a verb stem (Clitic=Pref-Pref-Stem). The variation in their pitch realizations may be due to whether the complex noun is treated by the speaker as a single element with final-syllable stress (*ka=ʤiŋ.ja.**rap***), or whether it is broken up into two elements, each with final-syllable stress (*ka=**ʤiŋ**-ja.**sen***). Further research is necessary to clarify this potential interaction.

3.3 Lawa word pitch

Our Lawa text shows a more drastic difference from Sora in terms of syllable numbers. Bearing in mind the shorter length of this text, the majority of words were of one syllable (223 instances), with fewer two-syllable words (69) and a single three-syllable word. Below we illustrate the pitch pattern of Lawa two-syllable words and the single three-syllable word.

3.1.1 Lawa 2-syllable words

In the Lawa words composed of two syllables in our dataset pitch increases to the second syllable. In Figure 20 we see this pattern exemplified by the word *kamtʰɔ* ‘after that’. Figure 21 below displays the normalized pitch contour of these words, which rises to the second syllable before a fall to the end of the word.

Figure 20: *Lawa word pitch in 2-syllable word* kamtʰɔ *'after that'*

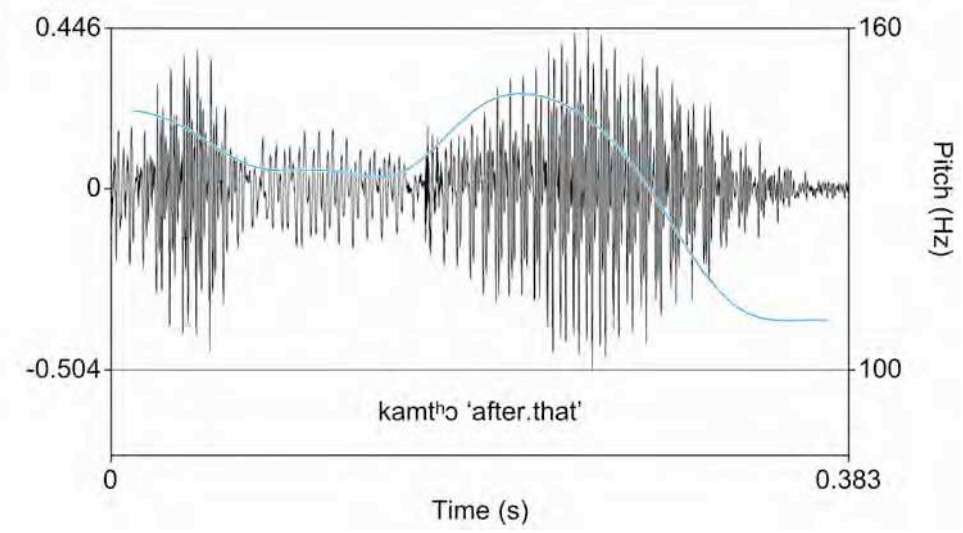
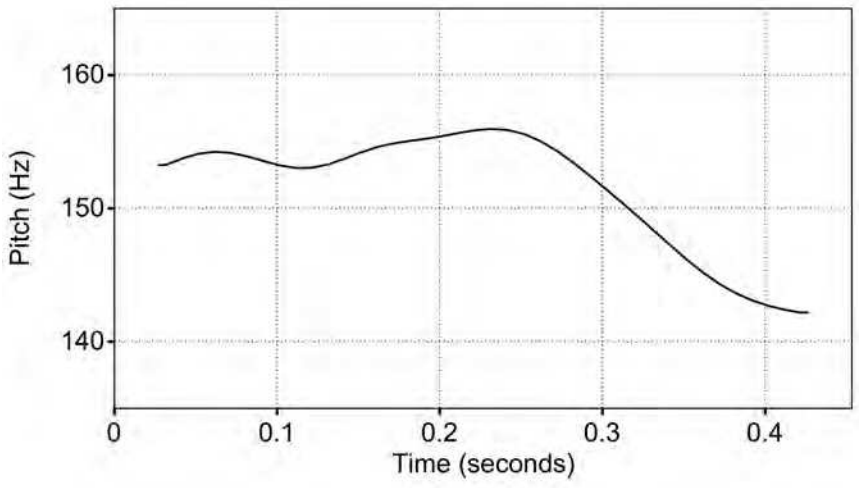


Figure 21: *Lawa normalized word pitch in 2-syllable words (69 instances)*



While we can see a peak at the beginning of the second syllable in the normalization, this is not an extremely steep increase from the beginning of the word. Unlike in Sora and Pnar, which both show an increase in pitch of 10-15 Hz across the two syllables on average, pitch in Lawa starts relatively high and increases by less than 5 Hz. However, given the dearth of two-syllable words in our Lawa sample it is difficult to treat this as a useful generalization.

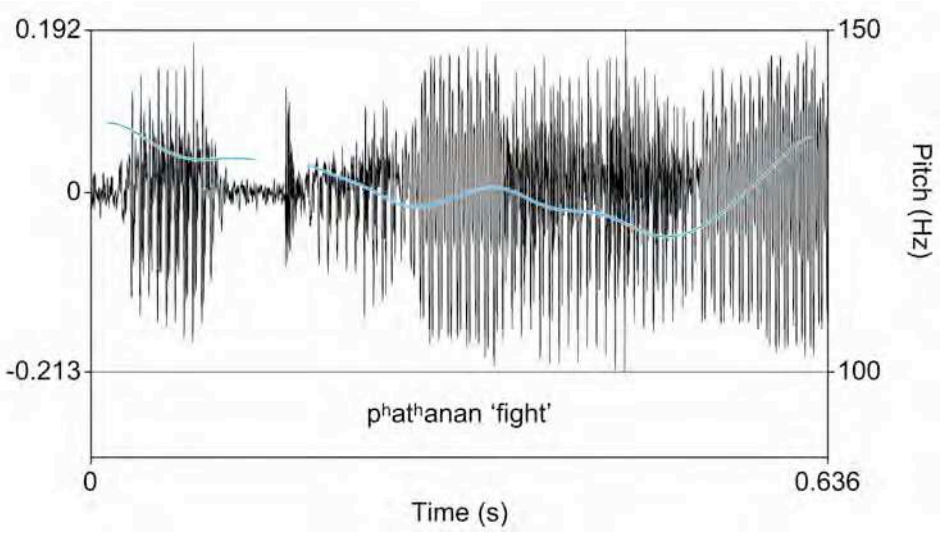
3.1.3 Lawa 3-syllable words

There is only one example of a three-syllable Lawa word in our sample, *pʰatʰanan* 'fight' (Figure 22), which our consultant said is a loanword from Northern Thai.[14] In this word, the pitch starts high and then falls, but

[14] Scholars we spoke to who are more well-versed in Thai (both historical and modern dialectal variation) are unsure exactly where this word may have been borrowed from, as a perusal of dictionaries does not reveal its presence. If a lexification, it is somewhat unusual in its use of aspirated /pʰ/ and /tʰ/ in relation to potential Thai source words, but we cannot pursue the phonology and exact source of this word at length here.

swings up at the end. Due to a lack of three-syllable words, it is difficult to draw any conclusions about this pattern, and since it is identified as a loanword it is entirely possible that the pitch pattern of the word was also borrowed from the source language.

Figure 22: *Lawa word pitch for 3-syllable word* pʰatʰanan *'fight'*



3.1.4 Lawa word pitch summary

As we see in the case of Lawa, our sample has too few two-syllable words to make good generalizations about the pitch pattern of these words. From individual analysis and normalization we only have some indication that Lawa words tend to start with high pitch and that there is a small (but possibly non-significant) increase in pitch to the start of the second syllable – probably best viewed as maintenance of the pitch target to the second syllable. While it is possible that more data will give clearer results, it is not likely to result in words with many more syllables. This makes observation of word pitch across syllables in Lawa difficult to compare with languages like Sora and Pnar, which have words with many more syllables. It is possible that comparing the pitch of phrases may overcome this challenge, but our data limits this kind of study, which we turn to briefly in the following subsection.

3.4 Instrumental analysis of phrase pitch

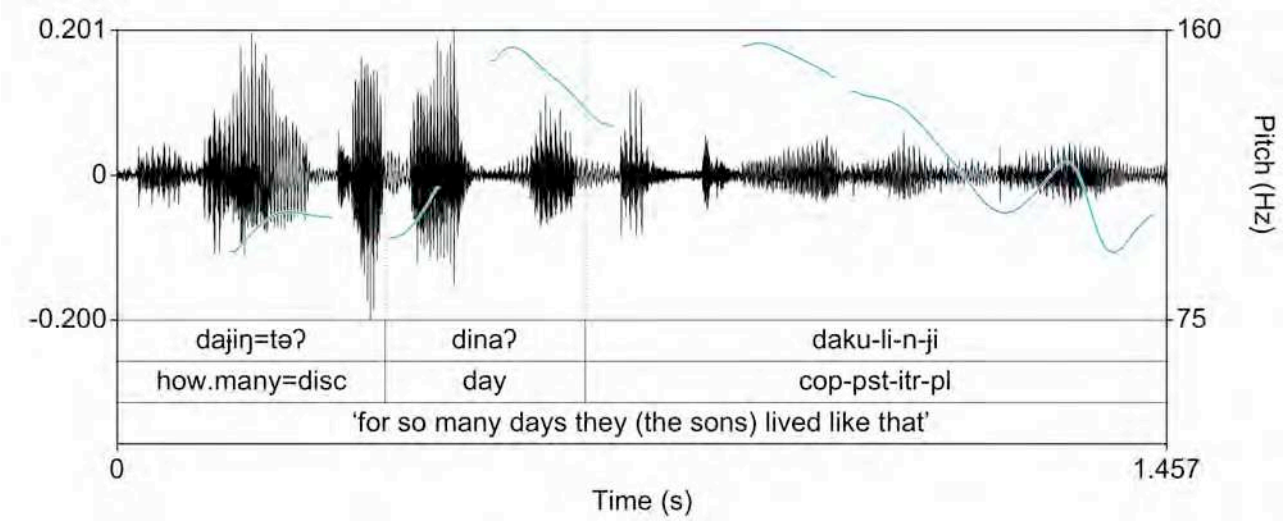
Phrasal pitch of these languages is beyond the ability of this paper to full deal with, though research in this area is a natural next step, particularly given the overarching claims of D&S. Here we present a very brief illustration of phrasal prosody in each language from the same data as above. Below, we annotate the prosodic pattern in a single sentence of each of the languages under investigation, with the acknowledgement that this is highly preliminary and deserves much more attention than we can give here.

Our criteria for choosing a sentence for display was that it be a complete, short sentence with a clear pitch trace. Due to the amount of variation in phrasal pitch between sentences, the difference in quality of the recordings, differences between our speakers, and the variation in phrase length, it was difficult to find sentences that were easily comparable between the texts in our sample. Some of these speaker differences are highlighted below, but as a result of this variation we provide the single pitch traces for illustrative purposes and use them to discuss potential rather than to make particular claims.

3.4.1 Sora phrase pitch

The Sora speaker in our recording produced sentences of the most variable length, with some short sentences like the one displayed here in Figure 23, and with long sentences of 10-12 words between 3-8 syllables long.

Figure 23: *Sample Sora pitch in phrase* daɟiŋ=təʔ dinaʔ dakuliŋi

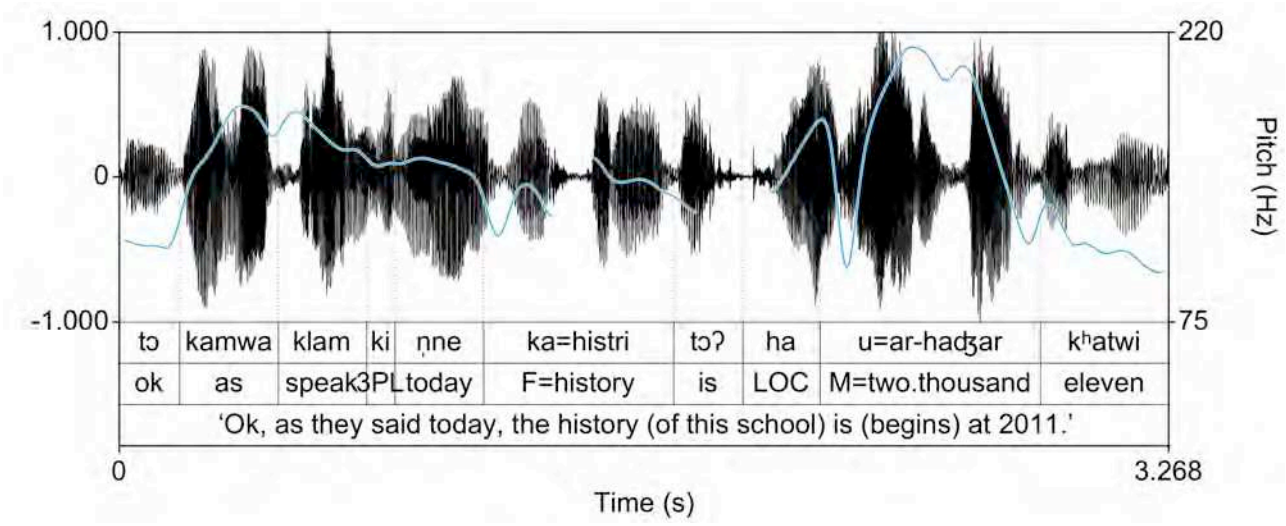


Pitch across this sentence is rather variable, with two high pitch realizations that occur in the relative middle of the clause. At the word level this figure does, however, illustrate the general trend in Sora for three-syllable words like *dajiŋ=teʔ* and two-syllable words like *dinaʔ* to have rising intonation on the final syllable, though clearly the relative pitch of the two words is rather different.

3.4.2 Pnar phrase pitch

The Pnar speaker in the text we annotated spoke with more lengthy sentences than the Sora speaker, making it difficult to find a single short sentence that corresponded clearly to our Sora example. Figure 24 is a pitch trace of one of the shortest sentences he produced.

Figure 24: *Sample Pnar pitch in phrase* tɔ kamwa klam ki ṇne ka=histri tɔʔ ha u=arhaʤar kʰatwi



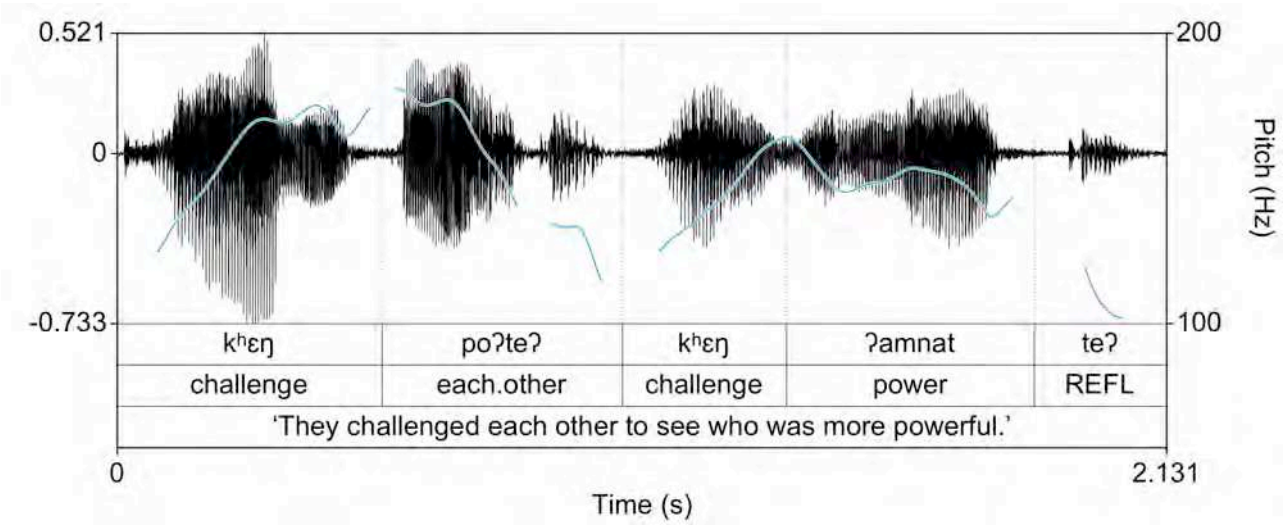
We can see that this relatively short sentence is 18 syllables long and shows multiple rising and falling pitch patterns, though with word-pitch rise and fall within these. The first large rise-fall corresponds to the adjunct phrase used to introduce the sentence (*tɔ, kamwa klam ki ṇne* 'Ok, as they said today'). The second rise-fall corresponds to the copula subject and the copular verb (*ka=histri tɔʔ* 'the history BE'), and the third rise-fall corresponds to the locative copula complement (*ha u=arhaʤar kʰatwi* 'LOC two thousand eleven').

It is not clear based on this single sentence whether rise-fall patterns in Pnar correspond to grammatical phrases, though given Rabel's observation for Khasi (section 2.3 above) this is a distinct possibility. Still, if we look more closely at the words within the sentences, we can see that apart from the end of the sentence and single-syllable words (which are more variable), high pitch in a word is associated more closely with the onset of the second syllable.

3.4.3 Lawa phrase pitch

The Lawa speaker spoke with many short sentences, one of which is given in Figure 25 below. Most sentences were between 3 and 6 words in length, with words being one or two syllables. As in Sora and Pnar, several peaks are observed in these sentences.

Figure 25: *Sample Lawa pitch in phrase* kʰɛŋ poʔteʔ kʰɛŋ ʔamnat teʔ



In Figure 25 the sentence is composed of five words, with 7 syllables in total. The larger rise-fall pitch contours correspond to two verbal clauses, *kʰɛŋ poʔteʔ* '(they) challenged each other' and *kʰɛŋ ʔamnat teʔ* '(they) challenged each others' power'. Both clauses could be considered grammatical phrases, though their proximity to each other means they are interpreted as conjoined. Unlike in the Pnar example, relative high pitch in words is consistently associated with the coda of single syllable words and with the second syllable of only one of the two-syllable words.

3.4.4 Summary of initial phrase pitch observations

While these three sentences by no means provide a comprehensive analysis of phrasal pitch patterns in the three languages, and we make no claims about the representative nature of these pitch traces, it is worth summarizing some observations. First, on the basis of these few sentences a rise and fall of pitch does seem to be tied to slightly different intonation units in each of these languages. In the Sora sentence, we see localized pitch rise relative to the word, with potential re-setting of pitch between words. In the Pnar example we see rise and fall of pitch largely corresponding to boundaries of grammatical units. In the Lawa example we also see rise and fall of pitch with grammatical units, but tied to different grammatical units than in the Pnar example. At the same time, in all three languages word-level pitch in running speech seems to follow a general LH tendency in two- and three-syllable words. Although more comprehensive analysis of sentence-level pitch needs to be made before the specific claims of D&S regarding phrasal prosody can accurately be assessed, already we can see that there are some differences in phrase pitch between Sora, Pnar, and Lawa that do not fit a Munda: Mon-Khmer division.

4. Discussion and conclusions

This paper has attempted several things. We have critiqued the work of Donegan and Stampe on the following fronts: their claims of rhythmic holism within Munda and "Mon-Khmer", their treatment of Sora prosody/stress, and their claims regarding "rising" and "falling" stress patterns, as reflected in pitch.

Regarding the final critique, we attempted to subject some of their claims to acoustic analysis in several Austroasiatic languages. In particular, we annotated words in three stories (in Sora, Pnar, and Lawa) and analyzed their pitch to see if this matched D&S's claims of a "falling" pitch pattern in Sora words and a "rising" pitch pattern in other Austroasiatic languages.

In acoustic analysis of our data we found that Sora and Pnar both showed an increase in pitch to the final syllable (or at least the onset of the final syllable) in two- and three-syllable words, and that Lawa shows a very slight rise to the final syllable of two syllable words. As noted above, D&S explicitly claim that Sora is a "falling-accented" language, and as Donegan (1993:10) states, "Falling-accented languages... mark accent, if at all, with pitch." Our acoustic findings directly contradict this claim, showing that Sora two- and three-syllable words have *rising* (not "falling") pitch, a feature the language shares with Pnar and possibly other Austroasiatic languages such as Lawa.

Sora and Pnar words with more syllables show greater variation in this pattern, with multiple peaks in pitch across the word. Sora and Pnar both show two peaks in some four-syllable words, possibly corresponding to the second and fourth syllables. This may indicate that these longer words are composed of multiple phonological words. In five-syllable words there is again variation in syllable peaks, and while there is too little data for a Pnar generalization (and possibly too little for Sora), in Sora we can observe a general fall from the second syllable of the word, with a small peak before the end. Words in Sora with more syllables, then, seem to correspond to the "falling" pitch contour of D&S, while words with fewer do not.

The single example sentence that we presented in each of the languages we investigated show multiple rises and falls of pitch which correspond to various units depending on the language. Other sentences that we could have presented for each language show somewhat different pitch patterns. That multiple pitch patterns exist in these languages does not easily square with statements by D&S regarding a single, holistic pattern of phrase pitch for the languages in question, much less a unified phrase and word pitch pattern in Munda vs Mon-Khmer. Generalizations may be possible with more data and more carefully controlled data, but so far this has not been done for Austroasiatic languages.

Given the results of our acoustic investigation, we tentatively suggest that iambic stress for (at least) two- and three-syllable words is a feature of Austroasiatic languages generally, including Sora within Munda and possibly all Munda languages. To claim otherwise creates a false dichotomy between South Asian Austroasiatic languages on the one hand, and all other Austroasiatic languages. Indeed, upon more careful examination the major claims D&S made can be simplified to:

1) an observation that the Western Austroasiatic languages (in eastern India) are different prosodically from those in the East (mainland SEA), such that pitch falls to the end of the unit in Munda languages while pitch rises to the end of the unit in 'Mon-Khmer' languages.
2) that this is a result of prosodic restructuring, leading to agglutination in Munda languages.

Our data suggests that claim #1 is largely false for words in these languages of 2-3 syllables, which show a primary rise in pitch across the West/East divide. There are also indications from observation of phrasal pitch that units composed of 4 or more syllables in Sora, Pnar, and Lawa, have consistent rise-fall patterns that in passing seem to be determined by function, though whether such patterns have similar functions in these languages is yet to be ascertained.

Claim #2 is a more specific claim about the role of prosody in encouraging certain kinds of word formation. However, given that there is little evidence for claim #1, it is difficult to see how the second claim could be assessed in regard to Munda languages. It is also not fully clear from the work of D&S how exactly a change in prosodic pitch could/would condition syllables to join more closely into agglutinating word structures in these languages. We would expect if claim #2 held true for languages descended from Proto-Austroasiatic that Pnar would also show these agglutinating word types (given its similarity to Sora in our analysis above), but in fact the number of syllables in a typical Pnar word is generally fewer than in a Sora word. This suggests that a refinement of the claim is in order.

Further, in its broad strokes the first claim is rather similar to the "Indosphere" and "Sinosphere" distinction proposed by James Matisoff, a general West/East geographical divide in terms of the linguistic typology of South and South-East Asia. Matisoff (1991:485-486) suggested that:

> "[It] is convenient to refer to the Chinese and Indian spheres of influence as the 'Sinosphere' and the 'Indosphere'... Some languages are firmly in one or the other... the Munda and Khasi branches of Austroasiatic and the Kamarupan [*sic*] branch of TB are Indospheric; while... the Loloish branch of TB and the Viet-Muong branch of Mon-Khmer are Sinospheric… Whatever their genetic affiliations, the languages

> of the ST area have undergone massive convergence in all areas of their structure – phonological, grammatical, and semantic."

By separating languages into the two Indospheric and Sinospheric camps, Matisoff makes a similar claim to Donegan and Stampe, albeit not in terms of a single organizing principle for the changes found in two groups of related languages. Instead, the claim seems to be that language contact across wide geographical areas is responsible for the changes by which languages from different families appear similar in many ways. While the observation is related to observations regarding 'spread' and 'accretion' zones around the globe (Nichols 1992), it seems a bit of an oversimplification here – a convenient generalization that does not necessarily help to illuminate the actual process of change and development of the individual languages in question.
Post (2011) makes a similar point, returning to the question of prosody as a potential source of similarity for languages in North-East India (where Khasian languages are also located). He notes (p. 218) that:

> "Diffusion of structural features requires more than simply contact: it requires learning and understanding: bilingualism and interaction... By contrast, prosodic diffusion requires little more than contact; contact, that is, followed by... imitation; not understanding... Through imitation of the observable behavior of others, prosodic features can, from a particular area of concentration, spread over vast geographical distances, bringing languages into close alignment with respect to some aspects of their linguistic profiles, despite their speakers never in fact having come into contact with one another."

While we agree with other parts of Post's paper,[15] the problem with this particular statement is that it does not clearly align with tendencies in the prosody of L2 speakers. In fact, non-native L2 speakers are easily identified by their accent, a large portion of which is prosody. This is enough of a concern that a growing area of second-language acquisition research is devoted to teaching correct stress and other prosodic patterns of a language (see Jung et al. 2017; Liu 2017; see also Xu 2011, 2012). The transfer of word and sentence prosody from a second language (L2) into a first language (L1), via what Post calls 'imitation', seems to actually require sustained bilingualism and multiple generations, just like any other feature of language claimed to spread via contact (though it may spread more easily than other aspects of language). This is an area that has not been well-studied; an edited volume by Delais-Roussarie et al. (2015) offers some insight regarding prosodic features that can spread due to contact. Many authors in this volume show that prosody spreads from the substrate (L1) to the superstrate (L2) rather than from the L2 into the L1 via 'imitation'.

This direction of spread suggests that speakers tend to maintain the prosodic system they grew up with rather than 'imitating' the prosodic system of an L2, such that an appeal to 'imitation' does not provide an explanation for why Munda and Khasian speakers might show similar prosodic patterns as neighboring languages. Other research shows that phonological features such as 'focus prosody' (see Wang et al. 2011 and papers in the same volume) are also unlikely to spread via contact, and that genealogy is a significant predictor for the kind of phonological domains found in a language (Bickel et al. 2009:72). If Munda and Khasian languages indeed present a similar prosodic profile as their Dravidian and Indo-Aryan neighbors in some aspects, this may actually be evidence for sustained bilingualism and contact at some point in history.

In any case, such sweeping statements as these need better evidence than we have seen thus far, and while the work of D&S is commendable for its attempt to say something meaningful about prosody in Austroasiatic and its relation to the history of the family, their main claims do not hold up well to scrutiny. We have attempted to provide actual speech data with our pilot study (a major shortcoming of D&S's work), but acknowledge that we do not have conclusive proof regarding word and phrase prosody in the three languages in question. What is needed are more language-specific studies within Austroasiatic that properly control for effects of word and phrase type, grammatical effects, and focus effects, as well as identifying actual acoustic correlates of stress at the word and the phrase levels. This will do the most toward advancing the study of stress (and prosody more generally) within Austroasiatic, so that we can begin to compare prosodic features of these languages with those features of their linguistic neighbors and relatives to tease out possible contact influence, historical inheritance, and historical development.

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[15] We agree, for example, with the main point of his paper, that the terms 'Indosphere' and 'Sinosphere' are problematic, "not only because of the possibly incorrect characterization of the proximal cause of typological alignment that they provide, but because of the pre-historical dominant/subordinate population relationships that they imply, for which – in several cases at least – no evidence whatsoever is available." (Post 2011: 219)

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